The Builder.

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Air in the Corners.

THE writer of the paper on which the discussion on the evils of overcrowding and on its remedy was founded has reason to be satisfied with the attention that has since been given to the subject. The president of the department enforced and illustrated ably what had been said; and his remarks, as well as the paper referred to, have given a text for many articles in the public journals. There is no difference of opinion as to the extent of the evil both in town and country, and very little as to the necessity of further legislation for its prevention.

"Much as has been done by the mere spread of knowledge [writes the *Times*], Sir C. Hastings believes it to be necessary for the Legislature to interfere more decidedly than it has hitherto done. It is certain that many necessary measures cannot be carried out until a conviction has been aroused of the absolute duty of adopting them. There can, indeed, be no question that health is wealth, and that the most careful sanitary precautions are economical in the end; but such a result is not often sufficiently apparent to enable us to trust to the operation of a mere sense of interest. If it is urged, not unnaturally, that an increased spread of knowledge will be sufficient to create this sense of duty, it must be acknowledged that a glaring proof exists of the extent to which prejudice and carelessness will neglect the most obvious precautions. Although it is notorious that small-pox might be almost driven from our tables of mortality by proper vaccination, it is still a prevalent and fatal disease in this country. There is some probability of a similar preventive being discovered for scarlatina; but, even if it should be, with such an example before us, there is reason to fear that the boon would be neglected or scouted for a long time by the mass of the people. But disease is an element with which a man has no more right to trifle than he has to play with fire. It is not his own concern, it is his neighbour's, and the Legislature is but discharging a public duty when it prevents a man or a petty township from risking the lives of the public by carelessness, prejudice, or obstinacy. A sense is certainly becoming more and more deeply rooted that there are few matters of more national concern than the sanitary condition of a country. The old adage that cleanliness is next to godliness, and that moral and physical well-being are indissolubly connected, is daily more and more acknowledged." To obtain that well-being, obedience to the physical laws laid down by the Creator is needed. The generalness of that obedience will, after all, depend principally upon the extent to which the knowledge of these laws is spread among Englishmen; and it is the greatest use of such meetings as the Social Science Congress to diffuse and enforce this knowledge: but, pending the spread of it, ignorance must be prevented from doing murder. From Scotland and Ireland, as well as from London, comes a similar response. Thus the *Buchan Observer*, commenting on the paper to which we have referred, writes,—"It is obvious that there would be difficulties in carrying out this proposed extension of the Lodging-Houses Act, but they are difficulties which could be overcome. If a house be perverted from its proper use; if the health of its inmates be systematically destroyed; if the well-being of the community among which it is placed, be endangered—and all this, and much more, might be said of over-crowding—then it becomes the duty of the Legislature to interfere, and make restrictions which shall be vigorously enforced. It is the constant complaint that the Lodging-Houses Act, though good in itself, does not go far enough—that, in fact, it fails to reach a class who are notoriously in need of its supervision. In Peterhead and other towns along the Scottish coast there are peculiar reasons for demanding its extension. Here, for instance, during the herring fishing, there is an addition to the population of some 3,000; the overcrowding is truly lamentable; physical and moral degradation are the direct and palpable results. Some power of inspection by the authorities would be of the utmost value, and this the Lodging-Houses Act fails to give. Many a town in Scotland would hail the extension which has been proposed, and we trust that those who have taken up the matter will not cease to agitate till its adoption by the Legislature has been secured."

A "Herts Vicar" adds a bundle of forcible facts to the already piled-up heap, and states what occurred in his own village. "I think," says he, "the real cause of the spread as well as the fatal effects of these diseases is to be found in the overcrowding of the dwellings of the poor. The natural consequence of such overcrowding is that the poor occupants are compelled, for several hours together, to breathe a most fœtid and unwholesome atmosphere, whereby it would seem the undeveloped frames of the young are rendered unable to cope with disease of more than ordinary violence, and which, in the case even of adults, would be most disastrous, were it not that they are invigorated by their occupation leading them to spend many hours in the open fields.

And such, in fact, is our own state. While the population has increased, house-room has not increased in the same proportion; so that not only have we in many instances two families occupying one cottage, but many of the cottages having but one bedroom; we have parents, grown-up sons and daughters, as well as young children, occupying the same apartment—an apartment, be it understood, in too many instances barely large enough for the healthful occupation of a fourth part of the number usually found sleeping in it, and with a window, perhaps, opening to the extent of 24 in. by 14 in. Well, therefore, might an intelligent labourer declare to me, that should he at any time have occasion to return to his bedroom before leaving home in the morning, after quitting it for a few minutes, he found the smell 'almost enough to knock him down.' It is, then, in this overcrowding that we must look for the cause of this fearful rate of mortality on the recurrence of epidemic disease."

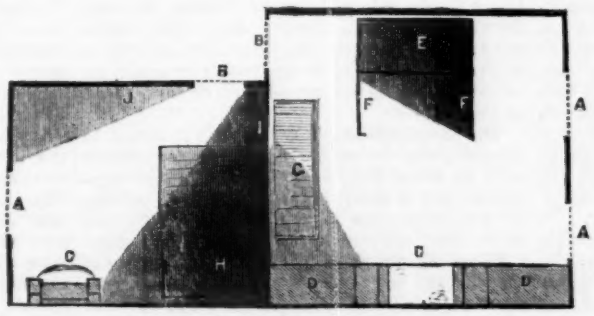
As remedies the reverend writer urges "the adoption of a wise, well-ordered, and generous system of emigration, under the active superintendence and encouragement of the national Government; and giving greater facilities for cottage building, by spreading the poor-rate over a larger area, so that it may not fall so heavily as at present on those localities where a large number of poor are necessarily brought together."

As we have said again and again, the condition of even the most crowded houses in London might be immensely improved if the poor possessed a better knowledge of the simplest sanitary laws, and no greater boon can be conferred upon them than to spread such information. Let us contribute a mite or two more with that end in view.

When estimating the cubical contents of apartments which are occupied by large numbers of the working classes, no account is taken of the extent of space occupied by the various articles of furniture, which are often so closely packed that there is barely room to move. For instance, in one apartment about 10 ft. in length, 8 ft. in width, and about 8 ft. high, the whole contents about 640 ft., there was one of the old-fashioned press-bedsteads, which, when put up during the day time, was so filled with bedding, &c., that it was equivalent to a solid mass of the following dimensions,—length 6 ft.; width, 3 ft.; height, 5 ft. Here we have at once 90 ft. taken away from the limited space. On the top there were boxes of different kinds, and other articles, which took up a space of at least 40 ft. more. An upright eight-day clock, set in a corner, about 7 ft. high, 2 ft. in front, and more than 1 ft. in depth, occupied about 18 ft.; a large tool-chest, 5 ft. long, 3 ft. in height, and 2 ft. in width, occupied 30 ft.; a chest of drawers, 6 ft. in front, 2 ft. in width, and 5 ft. long, about 60 ft. There were also hampers, chairs, a sofa-bed, a table, and other things, which cannot be estimated at less than 60 ft. By these various articles nearly 300 cubic feet of space were occupied; and at night, and during a great part of the day, five and sometimes six persons occupied this small ill-ventilated room, which may be taken as a type of many hundred others. Supposing that the number of inmates was five, the substance of the bodies would occupy an additional amount of space; but, without taking this into account, there would only be a fair breathing-space left of something like 68 ft. for each person,—a poisonous and dangerous limitation.

The bulky, unwieldy, old-fashioned furniture being discarded from many well-conditioned houses, still, by means of the brokers, finds its way into houses of a poorer grade, where there is not so much accommodation for its reception. May we hint that it would be well to avoid it, and to purchase such articles as metal bedsteads, which do not occupy much space, and prevent the assemblage of troublesome visitors.

In spite of the sanitary teaching which has been so earnestly given in various ways, there still exists an amount of ignorance on the subject which causes great mischief. In the dwellings of the industrious and poorer classes, there are corners as fatal to health and life as some of those to which we have referred as existing in certain hospitals. Nor is this to



The Ventilation of Corners.

AAA. Windows. BB. Doors. CC. Fire-places. DD. Cupboards. E. Press bedstead. FF. Folding-doors of the bedstead when open. G. Sofa bedstead. H. Bedstead. I. A partition, without any opening. J. Spot to which the bed was removed.

be wondered at when we glance at the actual condition of things. The accompanying illustration gives an example. The apartments consist of two rooms of very limited dimensions, one of which is used as a bed-room, and the other both as a bed- and sitting-room. Each room is entered by a door on the landing of a dark and ill-ventilated staircase. In the bed-room there is a very small window, not more than 3 ft. square, with a fire-place which is but 2 ft. wide and 3 ft. high. This, as well as the window, is situate in the angle farthest from the door. From the door, running at right angles, is a partition between the front and the back room, without any opening, and the consequence is that there is in one corner an unwholesome stagnation of the air; and it is usually the case that the worst part of a room is chosen to put the bedstead in. In this case the pillow had been placed in the corner in which the least possible change of air takes place. These bad arrangements are of constant occurrence, and we are glad to find the matter is beginning to gain the attention of some of the most intelligent medical attendants of London. From one we learn that in a bed placed in an ill-ventilated part of a room, he found repeated cases of illness. It is true that there was a sufficient amount of overcrowding when the children were in bed to account for this of itself; but on the bedstead being removed to a position where the air could circulate between the door, window, and fire-place, health rapidly returned; and, notwithstanding the overcrowding continued, there was a marked improvement in the appearance of the children. Many other instances might be given to show that the sanitary advice of the doctor, when acted on, has had as much effect as physic.

In the larger room there is both more space and better means of ventilation, for there are two windows, the door, and the fire-place; and the latter being more in the centre of one side of the room, is more effective than in the other instance. Notwithstanding, there are unwholesome corners in this room, even when attention is paid to the opening of windows; on the side opposite the windows, and on the other side of the partition, where the worst air of the bed-room collects, the atmosphere gets vitiated, and those who inhale it for any length of time complain of prostration and a disinclination to attend to their usual pursuits. Moreover, the windows do not open at the top, so that the upper part of the room at night is full of bad air. To remedy the evil conditions of such apartments is easy, and the expense would be but a trifle; the placing of three or four zinc ventilators in the partition between the two rooms, at about a foot and a half from the roof, and altering the windows of each apartment so that they might be opened about a quarter of an inch at the top, would be the means of allowing the fresh air to drive the impure from the corners; but there is such an objection to what is wholesome that it might be well to introduce perforated glass in the top parts of the windows, to make sure of the proper results. It would also be of advantage to make some openings near the top of the doors. The writer some time since knew a zealous advocate for ventilation, who, in the absence of his family at the sea-side, made air-holes through the bed-room-doors of the house by means of pistol-shots: a small centre-bit would act more safely, while securing a useful purpose.

Happening to be in some rooms on the basement of a house where the ventilation was notoriously defective, we saw some little boys amusing themselves by firing off flashes of gunpowder, and noticed how curiously the dense grey smoke became deposited for a length of time in those parts where the ventilation had been most neglected. Just in the same way as would the heavy poisonous gases which generate typhus fever, but which are not visible to the eye, did the volumes of smoke become deposited in corners where the air did not play properly about. The effect was most distinct when the sunbeams came into the place, and it was remarkable how soon certain parts were cleared, both of smoke and of sulphurous smell, while in others the atmosphere continued loaded for ten minutes or a quarter of an hour. In closets it was difficult to move it, even by fanning. The effect of firing off the flashes of gunpowder one at a short time after another, was that the smoke accumulated in dense masses just where was at first betrayed the greatest want of ventilation; and in rooms which were better ventilated every part became more or less uniformly pervaded by the effect of those miniature explosions, which soon passed away. To make this experiment is not pleasant; but in cases where ladies are sceptics in sanitary matters, it would afford the advantage of giving them visible evidence. Even in new houses, halls, and staircases, the state of the ventilation might be usefully tested by means of sulphuretted smoke. In carrying out experiments of this kind, the cordial co-operation of the small boys might be depended on; and perhaps a lesson in this way might be learned that would be useful in after-life.

By means of a ring of finely constructed metallic mesh, fitted into a circular aperture prepared for it in glass, and used either with or without a cover, and with a valve into a flue, Mr. Boyle ventilates apartments very satisfactorily. The valve, formed with pieces of mica, is so delicately sensitive, that two degrees of increase of temperature of the air of a room over that of the outer atmosphere, are sufficient to bring it into efficient action. The inventor remarks,—

"Heat, in excess, is one of the conditions found usually accompanying a bad state of ventilation; and this very quality, which now forms a portion, and that the most palpable portion, of the evil in question, is utilized by this valve, in being the motive power which keeps it in operation, whereby it not only works itself off, but carries with it at the same time the deleterious carbonic acid, and the other injurious gases and vapours with which a vitiated atmosphere is known to be charged."

In one instance, under our own eyes, Mr. Boyle has operated very successfully.

We have before now spoken of the want of ventilation in cupboards. An examination of a few, particularly those in which provisions are kept, will at any time prove the correctness of the complaint. In moderate weather, butchers' meat put in seemingly fresh in the evening, is found perfectly putrid in the morning. Chlorides of various kinds have been used for the purpose of purifying cupboards, but without effect. One housewife takes the trouble to blow air through her cupboard two or three times a day; others have tried weekly lime-washing; but nothing will do any permanent good if the proper construction of such places be not attended to, so as to admit of change of air.

The press-bedstead in such rooms is almost as unsanitary as the cupboards. The canopy passes over at about 3 ft. from the heads of the occupants; and in order to prevent air from getting to the sleeper, the folding-doors, when the bed is let down, are usually set open at right angles.

These, it may be said, are small branches of the subject; but they are none the less important. We desire to make people think of what is needed and what may be done, and to connect cause and effect. Doing this, they will soon be brought to admit the necessity of further legislation to combat the giant evil of overcrowding.

MILITARY SURVEYING.

It is almost incredible that very few officers in her Majesty's army, Sandhurst and Woolwich men excepted, can make a survey or even read a plan; yet this is stated to be the fact by Capt. Lendy.* It is, indeed, avowedly to simplify the difficulties that have hitherto precluded the attainment of topographical skill by officers that the work we are about to notice was written. The author found that the first stumbling-block was the want of fixed rules to figure the ground. The beginner was frequently daunted by the varieties of horizontal style, vertical style, pencil-brushwork, &c., and completely repulsed by the mysteries of the plotting-book. To remove as many as possible of these impediments to the progress of the military student Captain Lendy has treated only of those practical operations that are needed in actual service; but it must be owned these are so various, and involve consequences of so much moment, that it is difficult to imagine how any officer is able to pass muster without having acquainted himself with the mode in which these indispensable operations are carried on.

Simple as a military sketch of a district may appear, it tells a very important tale. A little difference in the shading of a contour, not exceeding the sixtieth part of an inch in the thickness of the strokes with which it is shaded, tells the experienced eye whether or not it is too steep for infantry to move with order, or for artillery to fire up hill, or for cavalry to trot up or canter down. Hence the great importance of a uniform mode of indicating certain gradations. Captain Scott, the examiner of military drawing, to secure this desired uniformity of expression by different draughtsmen, has proposed a system that will probably be introduced both at Woolwich and Sandhurst. An objection to his scale for shading plans consists in the difficulty of employing it, or any other precise rule, in a hurried reconnoitre made within sight of the enemy; but he contends, that under the most adverse circumstances the sketches of a dozen draughtsmen, all taught to draw with reference to one scale, are more likely to approximate to one universal language than if they had pursued different modes of delineation from the beginning. Leaving the enemy out of the question for the present, uniformity is desirable on every score. The reconnoitring of a route through which a convoy will have to pass is a frequent task; and that this should be executed upon the same principles every time that it is done must be of importance.

It would be unfair not to acknowledge our obligations to the French in the matter of military engineering. French influence is seen in many of the names applied to different objects, and felt in still more numerous ways. The lines of routes, or *itinéraires*, sketched as illustrations to Captain Lendy's volume, are French; and the table of the different subjects to be examined in a *reconnoitre* is that adopted by the French staff. Reconnoitring consists of two parts,—the plan or sketch, and the report. An enumeration of the different objects to be observed in the latter will best serve to show the proficiency in noting and drawing conclusions from minute and comprehensive details acquired by *les ingénieurs* of France. First, the order in virtue of which the operation has been made must be transcribed and placed at the head of the report; then follow five classes of observations in the following order:—1. A physical description of the country, including the geographical position of the ground reconnoitred, its general configuration, aspect, and access; the basins in which the ground may lie, its orography, its hydrography, the configuration of the coast, the nature of the soil, the aerography, the meteorological facts, such as whether the district is liable to violent storms, &c.; the plants and animals peculiar to the climate; the race of men, of mammalia, reptiles, &c.; the tides and their peculiarities. 2. Statistics, or the political and administrative divisions of the ground reconnoitred; the population, with number of inhabitants per square mile, proportion of men fit for service in arms, &c.; the number of militia and yeomanry; the language, religions, degree of instruction of the different classes of people, the number and nature of public buildings, of houses, the resources for lodging troops, materials of construction employed in the country, statistics of towns and fortified places, state of the agriculture of the country; number, condition, and products of woods and forests; cattle, the local industries, local measures, commerce, and public revenue. 3. Communications, the general outline, land communications, routes of secondary order, railways, navigation, canals, boats, and amount of navigation in rivers and ports, means of passing rivers and canals, telegraphic lines. 4. Military consideration, the advantages offered for offensive and defensive operations, suitable positions for a *corps d'armée*, with full information respecting places from which provisions, forage, water, and wood, could be drawn. 5. The general history of the country in which the ground reconnoitred is situate, its archæology, or remains of Greek, Roman, and Christian epochs, and a summary of the military events that have been enacted upon the ground in question. This document, when completed, is signed by the officer compiling it, and forwarded with the plan or sketch to the proper quarter. It will be seen that a first-class military survey is no easy matter: it calls for a wide experience, extensive knowledge, and great activity and industry. It is curious that it is at all times difficult to collect the required information. At home, alarm is taken by the residents in the neighbourhood of a survey that some exaction, either in the form of an extended billet or tax, is about to be practised upon them; and abroad, every fact is suppressed that would be likely to invite the approach of armed forces, and every obstacle magnified that would be likely to deter it. Notwithstanding this tendency, it is usual to question guides, shepherds, carriers, as well

* "A Practical Course of Military Surveying, including the Principles of Topographical Drawing." By Captain Lendy, F.G.S., F.L.S., &c., Director of the Military College of Sunbury. London: Atchley & Co., Great Russell-street, Bedford-square, W.C. 1864.

as mayors and bailiffs, care being taken to avoid alarming them. A knowledge of foreign languages is, therefore, an important item in the education of a field officer. On entering a country occupied by the enemy, information may be gained by examining and cross-questioning spies, inhabitants, hunters, muleteers, &c., concerning the roads, defiles, woods, hills, rivers, marshes, bridges, &c. When collated, discrepancies point out inaccuracies that may be successively rectified. It is a more rapid process to rectify a sketch made from tolerably reliable information than to survey and reconnoitre ground that is wholly unknown. When a survey has to be made under the eye of the enemy, scantier details suffice: the officer trusts to his memory and concentrates his attention upon those points which are of the most importance, such as the direction and inclination of acclivities, the rivers, rivulets, and their embankments. These scanned, and the time noticed that it took to walk or gallop to the chief points, he plots the various objects, by traducing time into distance, on his return to camp.

Captain Lendy gives heart to those who may hereafter consult his pages, by affirming that nothing is impossible, especially in topography. When in the field without either time or means to make a regular survey, and plans are imperatively called for to determine the movements of troops or select positions for encampments, it becomes necessary for a staff-officer to make the required sketches without instruments, or with the aid only of such instruments as he can construct on the spot. The chief requisites are measures for distances and angles. For the first of these there are three expedients, the officer's own pace, or the trot of his horse, or his watch, for distance is tolerably accurately laid down by time; and for the second, if a prismatic compass on a sextant is not to be had, a substitute may be improvised. A cross-staff and clinometer are the work of but a few minutes. A pin fixed into a plane table serves as a sundial, and nothing more is needed but a sheet of paper, pencil, piece of indiarubber, and a penknife. The more skilful the officer is who may be driven to these expedients, the more will his sketch approximate to a plan made in the regular way. He will first select a base and form a canvas (the sort of network formed by the triangulation of the chief points of the surface). He will then fill in the details. The various objects on the ground are represented by conventional forms, such as crosses for churches, parallelograms for houses, a horseshoe on an oblong base for a smithy, cones for ironworks; and the nature of the soil, whether marshy, rocky, muddy, subject to inundations, or riddled with rabbit-holes, is indicated by recognized markings. There are upwards of ninety of these signs to be borne in remembrance. Colours, too, have fixed readings. Gravel is rendered by dots of sienna over a wash of yellow ochre; marshlands by horizontal light blue patches running into green; troops are shown in the colour of their uniform; crops yellow; water blue, with shading on the shore; wooden buildings sepia; and so on. There are also conventional signs to indicate the nature of the troops, whether cavalry, artillery, or infantry; and others to show various differences in fortifications. By the aid of the plans thus formed and filled in with signs, the general decides upon the movements of his forces, where sieges, encampments, entrenchments, &c., shall be made, and battles fought.

When a plan is made to serve constructional purposes, it is made with accuracy as in civil engineering, or as in an architectural survey. It is only after arriving at a certain point that the three professions diverge. The members of each must be familiar with the nature of materials, their capacities to resist strain, the principles that govern the erection of roofs, arches, domes, &c., and the requirements of different soils in laying foundations. They may travel together so far. Then the military engineer must take a turning that branches off from the road, and leads to a closer study of the minute details of construction; for it may happen that he may be called upon to execute works with unskilled labour quite dependant upon him for instruction; and the science of military tactics must be brought to bear upon all his studies. Geodesy, geography, topography, planimetry, and levelling, must be all pervaded with one thought, that of the subjugation of the enemy, his lands, his forces, his stores, and everything that is his, and resistance to the offensive operations with which he might oppose this process. With this end always in view, the commonest objects present a twofold significance. The unpretending farmhouse, in the distant landscape, that has never echoed with sounds more formidable than the bellowing of cattle, becomes a defensive position. An old stone wall, or a ditch, or hedge, is elevated into a cover, and an obstacle for troops. Gardens, orchards, meadows, vineyards present themselves to the eye as possible forage grounds for men and cattle. Bridges give rise to a calculation of how many men, horses, and waggons they can transport, or how they can be most easily destroyed. Roads and paths, rivers and canals, are so many military communications: wayside crosses or fountains only so many rallying points for armed men. A railway station becomes a point of concentration. All ground is considered only as whether it is available for the movements of troops, or offers advantages for other military operations. All contours and under features are examined for the same information. The last-mentioned objects are those which offer the greatest difficulty to the military draughtsman. As it is a matter of the greatest moment that the altitudes and slopes of hills and mountains should be understood by the officer for whom a survey has been made, these have to be made apparent. Captain Lendy explains the principle upon which contours are shown, by describing the experiment in Burr's system of surveying. If the student would thoroughly master the subject, he should take a stone that is shaped like a hill, and fix the base of it with clay into the centre of a box provided with a plug-hole. He should then fill the box with water, stained with Indian ink. This water is to be drawn off in certain quantities at intervals, giving time enough between each abstraction to leave a watermark upon the stone. When it is all drawn off the stone, or model of a hill, will be stained with horizontal lines or contours which will mark the relative steepness of its parts; for the level of the water constitutes a horizontal plane, therefore the contours are the intersection of the model by parallel horizontal planes. To give a figure to these contours resort must be had to combinations of shade. There are three methods of doing this,—The English, French, and German systems.

The English system of giving expression to contours are of two kinds, the horizontal and vertical styles. The former is that used by Major Petley for the instructions of cadets at the Royal Military College; and by Captain Richards, the instructor of military drawing, at Sandhurst. In this style the ground is figured by horizontal strokes more or less thick, and the altitudes given in figures. The objection to this mode of delineation is, that the roads, in hilly ground, are not easily distinguishable from the horizontal strokes with which they are parallel. In the vertical style the strokes take the direction water would follow on its descent along the slopes. It is found to be no more accurate than the former style, and to labour under the additional disadvantage of requiring more time to execute. It was, however, that used by the officers of the Quartermaster-General's department in the Crimea. Every one giving his attention to this subject must see the advisability of the adoption of one mode of conventional drawing throughout the service, and echo the regret of Colonel Jackson that such a diversity should be permitted; for when an extensive district is to be sketched, and several individuals are employed, it is impossible to unite their sketches so as to form a complete whole, or to determine in which district the most elevated ground is contained. Captain Lendy says the remedy is simple enough: "Let the Council of Military Education fix upon a system, and recommend it to Sandhurst and Woolwich."

In the French system the original contours are preserved on the plan, and hachures are traced perpendicular to them, the equidistance compared with the length of these hachures giving the ratio of the slope. In this mode accuracy and expression are combined; but, like the vertical style, it is at the expense of tediousness. The German system differs from the French in so far that the hachures may be perpendicular to the normal contours with or without reference to their equidistance. The German method of shading marks the leading features very prominently in bold black strokes, but this leads to the inconvenience of obscurity in the small details. Perhaps the best mode would be that which adopts the advantage and rejects the drawbacks of them all,—such a one as Captain Lendy shows in a figure, where the original contours are preserved by representation in horizontal strokes and dots, widening and converging according as light or shade is required. The popular military map of the scene of war bears as little relation to the minute serviceable plan wanted for strategical operations as a garden sun-dial does to a chronometer. The German authority Lehman gives a series of gradations which admit of manœuvres. On a slope figured as 5° infantry may move with order, and fire and charge down hill effectually; at 10° their movements are more difficult; at 15° their fire up hill is harmless; at 20° they can only fire singly; at 40° a chasseur or rifleman must be without baggage, and use his hands as well as his feet to make an ascent; at 45° only picked men used to hilly countries can manage to do this, and even they are in danger of falling. Cavalry has its most effective shock up hill at a gradation of 5°. At 20° the descent of cavalry must be without order, and obliquely. Hussars may ascend at the gradation figured as 30°, but with great difficulty, and only when the slope is of soft earth. Artillery is still more limited in its capacities to counteract natural obstacles. At a slope only of 10° it moves with difficulty, and its effectual and constant fire ceases. At 15° it is *hors de combat*. To give these gradations accurately in the shading is the grand *desideratum*; to give them uniformly throughout the service is only second in importance to this requirement.

Military topography was originally made in writing; the imitative drawing is comparatively a novelty. Plans, as we have seen, are still accompanied by reports. By the aid of the plan, the general unrolling the scroll that contains it takes in at a glance information that would cost him some considerable time to read if it were in the form of notes. Models possess the advantage of a still more accurate representation, but they are too cumbrous to take into the field, and take too much time to make for them to be available for all purposes. As records they are serviceable, as in the case of the models deposited in the United Service Museum, and they can be understood by those to whom the most correct military plan would be a mystery. Captain Lendy gives specimens of the different kinds of plans in use,—photo-lithos of the French ordnance survey (scale 1-80,000th), of the English ordnance survey (scale 1 in. to the mile), military sketches by Major Petley and Captain Richards, the sketch given to the candidates for admission to the Staff College in 1861 and that given in 1863, all the conventional signs, specimens of the different modes of figuring the ground by interpolated contours, the horizontal style, the vertical style, eye sketches, illustrations of the various stages of copied plans; and from these a great deal of general information upon the subject of military surveying may be acquired. In these days of wars and rumours of wars there are few persons who would not find much to interest them in the gallant captain's instructions, which here and there glitter again with realizations of the pomp and circumstance of warfare. The scope of the volume does not compass any note of fortifications, but the one department treated of is so comprehensive, that the student must be very versatile in his tastes who would wish for more. When he has mastered the various intricacies of a military survey he will be an accomplished officer. We alluded to the absence of all instruction concerning the art of erecting fortifications to show that the subject has a limit, and that this has been judiciously observed. The text is interspersed with a hundred and fifty-one figures, besides the forty plates alluded to, the explanatory nicety of which prove that Captain Lendy not only thoroughly understands the subject himself, but excels in the art of conveying a knowledge of it to others. The various instruments used are figured, as well as the rough substitutes for them to which an officer may be driven. He shows how a piece of paper folded may serve to measure and trace an opening or give angles; and tells how distance may be measured by sound or by beat of pulse, or by observation of the number of yards at which men or horses appear as dots, or windows of houses can be seen, when the regular modes of computing either are unavailable. In the instrument department the French also do well. M. Trinquier has recently invented an instrument of so simple a construction that it can be made in a few minutes, which enables an officer in the field to protract bearings and lay down distances without protractor rule, scale, or compasses. The staff officer in France sees, however, that his regular instruments are made as portable as

possible. His plane table divided in strips and pasted on a piece of linen or kid, he can fold up and carry in his holsters. Major Fèvre, of the French Staff-corps, constructed a plane table for military reconnaissance with magnetic compass, scale, and sight-ruler, complete, measuring 11 in. long and 8 in. wide, that only weighed 28 ounces, and which is found to present so many excellences that it is generally preferred to any other both in his own country and this. That our neighbours are equally skilled in the art of modelling tracts of country or coast there is ample evidence in the Louvre. The officers of continental armies being thus accomplished, there is all the more need for a close application, both on the part of our instructors and cadets, to the studies, experiments, and practice, without which proficiency cannot be expected. Captain Lendy adopted a useful feature when he contrived to incorporate with his instructions an impression of the excellence at which other powers have arrived in their military skill. This will inculcate a respect for those with whom we may be hereafter allied, or to those with whom we may have hereafter to contend, which will serve the purpose of forewarning idlers that there are others in the field whom it would be unwise to count upon as reeds shaken by the wind.

Now that the volunteer force has become an institution, there is, doubtless, a more general interest in military surveying and engineering than would have been found ten years ago. Every volunteer would enjoy a military survey of his district; and to make it himself would invest it, as well as his amateur profession, with new lights, and at the same time qualify him for real work of the same kind should the need for it ever come to pass. The heads of schools, too, will find, from the same cause, a relish for martial matters in those under their care which, though always latent in Young England, has not been always apparent. To these classes of students, as well as to the cadets for whom it was intended, Captain Lendy's practical work will be very serviceable.

THE INSCRIPTIONS AT NEW GRANGE.

We have received from the Rev. James Graves, honorary secretary of the Kilkenny Archæological Society, the following letter:—

Sir,—In the leading article of your number for September 24th, which is full of interest to those who are inclined to speculate on the Pyramids, you rightly cite the Great Mound of New Grange, on the Boyne, as of analogous construction.* But you add that there is on one of the "basons" an Ogham or Runic inscription, "which has been translated as the '*tomb* of the hero;'" on the other "bason" also "an inscription, which has been translated as the '*house* of the god.'" And then you state, as if quoting another inscription, "The Chamber," in which these basons are, "is dedicated 'to the Great Mother, Ops.'" Now, the *Builder* is a journal of wide circulation and high authority; and statements of such importance and interest as the above must prove to all archæologists, made with such an air of absolute certainty, are sure to be quoted as facts, if now allowed to pass. I wish, Sir, that your statements were true, for then would our Great Irish Pyramid become of tenfold interest: but I am sorry to be obliged to give them *an unqualified contradiction*. Irish archæologists are well aware that there is not a vestige of an inscription (though there are many rude carvings), on any stone, now visible, in or about the mound of New Grange; or, indeed, I may add, on any other monument of a similar age and character in Ireland. I have examined the chamber myself, and so can speak positively as to their absence at New Grange; and I beg to refer you and your readers to Sir William Wilde's description of New Grange, and its cognate Pyramidal mounds on the Boyne, given in his admirable volume, "The Boyne and the Blackwater" (McGlashan, Dublin, 1850), for the latest and best information on the subject. Like the Great Pyramid, our Irish one gives no "literal" account of the object for which it was erected.

Now, before giving our authorities for what we stated as to New Grange in our review of Professor Smyth's book on the Pyramids, we must remark that we not only regard Mr. Graves as a very high authority on such a point, but that, when we ourselves visited New Grange, we, also, neither saw nor heard of any such inscriptions as those to which we have nevertheless had good authority for referring; but our not having seen them does not prevent us from believing that these inscriptions had at one time been seen by others, as stated,—whether now existing or not existing, or whether they be only visible in the dark chamber under very favourable circumstances as to light and position. As to the *latest* information, both Mr. Graves and Sir William Wilde will excuse us, we feel assured, for remarking that on such a question the latest information may not be the best. The information we have to adduce is, on the contrary, not far short of one hundred years old; and, considering that ever since the opening of the passage into the central chamber, the influence of the air has been operating on the inscribed surfaces, in such a case the *earliest* information is probably the best.

In 1770, according to the *Archæologia* (vol. ii. pp. 254, &c.), Governor Pownall read a paper on New Grange, before the Society of Antiquaries, in which he says,—

"Examining very narrowly, with a candle in my hand, all the parts of this cemetery, I discovered, on the flat stone which forms the north side of the left hand niche, what I took to be the traces of letters. Their form is given in the wooden cut annexed [it is notable that the first of them very much resembles, in style of character, several recently discovered among the Northumbrian rock symbols]. These lines were of a breadth and depth in which I could lay the nail of my little finger; and of different lengths, from 2 in. to 6 in. I tried for some time to assign, if possible, these letters to some known alphabet, by comparing them particularly with that of the Beth-luis-nion, or old Irish alphabet. . . . . These characters are evidently neither Irish, Runic, nor Saxon."

Pownall was of opinion they were Phœnician; but Higgins, in avoiding to quote Pownall's remarks as to the inscription, gives as his reason, "the old languages of Ireland being unknown to" Pownall, and hence his *opinion* on the subject, "not to be depended on," although he does not doubt the fact of the inscription having been seen, —even with a candle, we may add, and hastily, after having "remained in the cave much longer than was prudent," whereby he "caught a violent illness,"—circumstances which may account for his not having seen the other inscriptions now to be also spoken of.

In 1786, Colonel Vallancey, in his "Collectanea Rebus Hibernicis" (vol. ii. p. 211), says,—

"The most ancient inscriptions *now* [in 1786, or previously] *remaining* in Ireland are undoubtedly those found in the tumulus or mount of New Grange, near Drogheda, in the county of Meath. This curious remnant of antiquity, which appears to have been a *sepulchre and temple*, we shall defer giving a particular description of. . . . . Confining ourselves here to the explanation of the *several inscriptions found in the cave or dome* situated in the centre of the mount."

He then minutely describes and explains no less than seven of these inscriptions; but we shall only quote as to those three to which we referred in our article on the "Pyramid:"—

"No. 3 is found on the front of the covering stone of the east tabernacle, and is written in symbolic characters, signifying *the House of God*. It is remarkable that all the ancient altars found in Ireland, and now distinguished by the name of cromlechs or sloping stones, were originally called *Botal*, or the House of God; and they seem to be of the same species as those mentioned in the Book of Genesis, called, *by the Hebrews, Bethel*, which has the same signification as the Irish Bothal. The tabernacles in the mount of New Grange have an exact conformity to the cromlechs found in different parts of the kingdom.

No. 4 is found on the south side of the east tabernacle, *written in the Ogham and symbolic characters*. The symbol is that representing the earth and universal nature, and with the Ogham, which is written from the left to the right, makes *a mor àn Ops*, that is, *To the Great Mother Ops*, or to the great Mother Nature.

No. 6 is found on the north stone of the west tabernacle, *written in the Ogham Bobeloth and Ogham Croabh characters*, from the right to the left; the first character being an Ogham Œ, the second a Bobeloth M, and the others in the Ogham Croabh are G, U, H, making Oenguh Oenguih, that is, *the Sepulchre of the Hero*.

At what time this tumulus was erected cannot be ascertained: it probably was not long before the art of writing became universal in the island, as all the different species are contained in the inscription."

May it not be that the inscriptions in the sorcery-hall at New Grange would still be visible under favourable circumstances as to light and position, although none at all may be seen under other circumstances? Pownall's *candle*, and his fatigue, or impatience, were not likely to reveal all those inscriptions which Colonel Vallancey afterwards so minutely describes, and hence Pownall seems to have only observed *one of them*, though the others seem to have been afterwards seen there. Just so none of them may usually be seen, even though they be still there, and might perhaps be made visible by a light such as the magnesium wire light, for example; but it may be, that during the last fifty to a hundred years, or since the passage was opened and the incisions exposed to the influence of the air, they may have all scaled off. Whatever be the case, however, in this respect, there is quite sufficient authority for all that has been said in the *Builder*.

We may add, that Mr. Graves is mistaken in supposing that we stated the inscriptions to be *on* the basons in the niches,—or kistvaens, as Pownall calls them.

These "basons," by the way, are between 4 ft. and 5 ft. long and between 3 ft. and 4 ft. broad; so that they may well be regarded as analogues of the kists of the Egyptian pyramids.

* Did the fact escape you that Gaelic tradition derives the earlier colonists of Ireland from Egypt?

TRICKS OF TRAVELLERS.

Under the heading of "The Brothers Davenport," a party of adventurers from America, five in number, here to exhibit certain "manifestations," have been so fortunate as to obtain such prominent notice by well-known writers in leading journals as will doubtless send numbers of persons to them. Written with candour, and describing, we have no doubt truthfully, what occurred, the unquestionable inference to be drawn from the notices nevertheless is, that the writers believe they witnessed an exhibition of some unknown intelligence and force,—"an annihilation of what are called material laws;" and the notices are thus calculated to do much mischief. A week ago the writer was present at a *séance* with the party in question, in the private house of a distinguished gentleman: lords, ladies, naval captains, poets, artists, and public writers, formed the circle; two of the mediums,—*not* the Davenport brothers, by the way, to whom the power was at first attributed, as one of them being unwell had his place supplied,—were tied to their chairs in a manner that seemed quite secure, and then very complete darkness being produced, guitars were strummed, bells were rung, and individuals touched; while, on the candle being lighted, the two mediums were seen still tied in their chairs. Other acts followed, such as have been described in the newspapers; thus the coat of one of the performers was whisked off (in the dark), and a loose coat, opportunely in the room, was whisked on. Again darkness, and the removal of the cords was heard, ostentatiously grating, and a light showed the performers unbound in their chairs, to which afterwards they were again tied up by "an unknown force!" When we say that half the eminent persons in the room, professed themselves thoroughly assured that other than ordinary agencies had been at work, it will be supposed, and rightly, that the tricks were cleverly played. The whole affair, however, is too gross and preposterous to stand a moment's reflection. Only admit that one of the two mediums so contrives, when being tied, that he can free his hands, and all else is perfectly simple. The whole proceeding is not half so difficult to comprehend as some of the professional conjurors' tricks, and it might be thought we were wasting space in thus stepping beyond our province to denounce the imposition; but when it is found that a Master of Arts more than hints that these adventurers belong to a quiet society, "the silent heralds of a social revolution, which must shake the world!"—and we know the extent of the "colossal self-deceit," which permits itself to be made stronger by such exhibitions,—it becomes the duty of every man who can obtain a hearing, to assist in exposing the injurious imposture. By what curious shutting up of the reason intelligent men and women can bring themselves to believe that those cords were noisily pulled through the loops into which they had been twisted, and were afterwards put round the performer, and tied clumsily to the table, without hands, it is difficult to say. Just reflect on one of their assertions, that unless a circle is formed by the spectators, if people in the dark can be so called, holding each other's hands, nothing can be done; and that if broken some one's head will be so too; and recollect that after all it is no circle at all, only a part of a circle, and it must surely suggest that this threat is merely to prevent detection. If the writer, when his own hand was pinched by a hardish thick hand with very tangible nails, recognized with tolerable certainty as that of one of the mediums, had sprung out and seized hold of the arm beyond, he would probably have received a blow on the head with a hand-bell or guitar, but the trick would have been made obvious to those who were willing to be convinced. The entertainment closed by the table rapping out the word "Retire," much as they say "Farewell" in coloured fires at the close of a pyrotechnic exhibition; but the slovenly manner in which this was done by the operator showed in what contempt he held the common sense of his audience,—running rapidly on with the alphabet when the letter sought was at the end of it, and pausing when he came to the letter itself, so that it positively did not need the raps, which were once or twice in the wrong place, to make out the word that was desired. These practitioners were chased out of Canada, according to a most circumstantial statement in Toronto papers; one of them, it is asserted, was formerly in the employment of the Wizard of the North; and the whole affair will doubtless be blown in England presently; but in the meanwhile they

are aiding an evil delusion which is much more widely spread than some believe, and will walk off sneeringly rejoiceful with pockets full of John Bull's guineas.

NOTES OF A PROFESSIONAL TOUR IN THE COLONIES.*

St. John's is built in a sheltered situation, on the declivity of a hill, on the west side of the island, originally selected as a protection against hurricanes, which generally rise in the south-east, sweeping gradually round to east, north, and approaching the south,—indeed, nearly all round the compass, before they are spent: so the situation is good on that account.

The city is well and regularly laid out: the main streets are spacious, and run east and west, to catch the breeze from the trade winds; and there are narrow streets running across them at right angles, one of them being the principal street (Market-street). The carriageways of the streets are in very good order, and there are good channels, paved with flat stones, on each side, which is the only drainage they have, as there is a strange prejudice against covered drains. The city is tolerably well scavenged; but almost every house is required to have a privy with open cesspit, a most unhealthy arrangement, and an intolerable nuisance in a hot climate. There is at present no supply of water except what is caught in iron and masonry tanks from the roofs of the houses; but a plan of water supply has been laid out, to procure water from the elevated hills and springs in the south-west of the island, the estimated cost of which is 30,000*l*. The population is about 8,000, and the whole island contains about 35,000: of these 26,522 are blacks, 2,172 whites, and 6,714 coloured. This population is ascertained by a correct census; and at the last census it was found there was an increase of about 2 per cent. only: probably this slight increase arises from the same causes that are in operation at Jamaica.

The principal building is the cathedral, a large and imposing erection, built of magnesian limestone, which cost the colony nearly 40,000*l*. The architect was Mr. Fuller; but the style of architecture was selected by the committee of management, and is not quite suitable for a cathedral. A good view of it is given in the *Builder* (vol. vii., p. 595), and a description of the works. The interior is not yet finished: the pitch-pine lining, pews, &c., want varnishing, and the exterior face of the stonework is decayed in many places. Ransome's stone preserving process has been used without effect, as decay progresses, probably occasioned by those which have been selected being too soft. The stone with which the old cathedral was built is said to be much harder and more durable. It stands upon the site of the old cathedral, which was completely destroyed by the earthquake of 1843, and precautions have been taken in the new building, by the addition of a peculiar framework of timber, to prevent such another catastrophe.

The cathedral stands upon the highest point of the city, and from the west front you have a magnificent view of the whole city below you, the harbour and shipping, Rat Island and raised Causeway, Fort James, and Goat-hill, and the remarkable hills of Five Islands, and the huts of Green Bay Village (Rogue's town), and the background of the picture is the dark blue sea. Below the cathedral, on sloping ground, is the burial-ground, intersected with paved pathways, and shaded by avenues of trees, called the Barbadoes evergreens: the roots of these trees have the peculiar property of spreading and penetrating to long distances, frequently uprooting walls and buildings. There are some fine monuments of distinguished men, Bishop Rigaud, and others, in the graveyard. The burial-ground is surrounded with a wall, and at the principal gateway on the south side, the pillars are surmounted by two good statues of saints, which were primarily intended to adorn some Catholic edifice in Guadaloupe, or Martinique, but were intercepted by a British man-of-war, and carried away as trophies, and are now erected to embellish the entrance to a Protestant cathedral.

Government House is a large quadrangular wooden erection, situate in a slight hollow, to the east of the city, laid out in the tropical style, with spacious balconies, and verandahs below, and windows with jalousies above. It has a large entrance-hall, and on each side are spacious dining and drawing rooms (the latter newly made), and on the upper floor a full suite of sleeping apartments. The drawing-room and governor's offices have been recently altered: a building that stood east and west has been reversed, and placed north and south; and to accomplish that object, and to lay out the grounds around, they have absolutely diverted and spoilt one of the principal entrances to the town,—in fact, planted the building immediately across the line of street. The alteration of this building has cost upwards of 4,000*l*.: almost as much money has been spent upon this ill-built botched-up structure, as would have erected an elegant mansion, suitable for the Queen's representative, on a more elevated and eligible site to the east of the city.

This matter has been a subject of warm controversy between the governor and Assembly, as the former wished a change of site, and a more convenient building.

The Court-house is a large, square, neat, and spacious building of *painted* stonework: it contains the chambers for the Assembly and Legislative Council above, and a court below for the law and administration of justice. The upper rooms are sometimes made use of for balls and other entertainments.

The Market House is a new erection. It is situate in the lower part of the town, close to the harbour. The market-place covers a large quadrangular piece of ground, about 220 ft. long, and 90 ft. wide; and on the north and south sides are erected two ornamental timber buildings, 23 ft. wide, the whole length of the plot, the outside being closed in from the street, and the inside left open, and supported on hard wood pillars, varnished, the spaces between them being filled in with an ornamental balustrade. An open space is left between the buildings, which is planted with some of the beautiful evergreens of the tropics for shade, and for those who prefer to sit out in the open air instead of inside the building. The buildings are laid out with stalls and stands, which are well supplied with the products of the colony, and form an object of great attraction to the inhabitants. A fountain was laid out to be fixed in the centre of the open space, so as to afford a good and convenient supply of water. A slaughter-house was to be erected at the north-west corner, and a fish-market at the south-west corner, on piles over the harbour, so that all filth might be readily washed away, and a good supply of water obtained for cleansing purposes.

The market has been visited by many strangers from the other West-Indian islands, and they one and all agree that it is without doubt the best arranged and most complete of any in the West Indies. I understand they are going to erect one at St. Kitt's, on the same model, it is so much approved of. The treasury and library in one building is a good substantial brick erection, with a wide gallery and verandah in front. The rooms are spacious and convenient, and it is just opposite the market.

They have a large space of ground laid out for a public hospital, established by the late benevolent Rev. Mr. Holberton. It is rectangular in shape, and at the east end are detached buildings for house-surgeon's residence, surgery, and dispensary. On each side of the plot are several small detached wooden houses, or huts, about 18 ft. by 9 ft. or 10 ft., containing each four beds, and they are built about 3 ft. above the ground. At the west end is a large building, with ground and upper floors. The upper floor is used for the seamen's hospital, with three wards, 17 ft. by 16 ft., containing each six beds; and there is a gallery, 4 ft. wide, to the east, for the exercise of convalescents.

This hospital is better laid out and arranged than those at Honduras are, as many medical men prefer the small detached houses, enabling them to separate cases; but still this hospital is open to great improvement: it is too much crowded, and the site is one admirably adapted to lay out a fine and commodious building, on the pavilion or other open and airy principle.

Near the hospital they have a small botanical garden, called Holberton Gardens, in which all the tropical flowers, and many cultivated in England, bloom and flourish in rich luxuriance.

The old gaol has been abandoned some time, and they now occupy what was formerly the barracks for that purpose. It is situate to the east of the city, and it contains wide galleries on the east side, and large, lofty, and spacious cells, which are well ventilated. It is not well arranged for such a building, but still it is a marked improvement on the old "black hole" typed structure. The prisoners are principally and usefully employed in repairing the roads and on the public works; and it was suggested that Antigua should become the depôt for West Indian criminals, and that they should be employed in the improvement of English and Falmouth harbours and works connected with it, so that these fine and hitherto neglected harbours might be made available for every purpose,—amongst others, the central depôt for the West Indian packet service.

There is also a small lunatic asylum, which usually contains about forty lunatics. It is situate on the summit of Rat Island, in a very cool and healthy place; but the buildings themselves are totally unfitted for the purpose. The main building is within the enclosure of the yard: it has seventeen cells on the ground floor, and five above: those on the ground floor are 7 ft. 6 in. by 6 ft.; and the passage between the cells is only 3 ft. 6 in. wide. In those small, confined places, are the unhappy lunatics shut up at night with the thermometer ranging above 80°, and this is sanctioned by the Government of a Christian colony, presided over by high dignitaries of State and Church.

There are, also, a well-arranged police-office, and a poor-house: the latter is very much overcrowded for the want of room in the building, one ward 19 ft. 9 in. by 16 ft., being occupied by nine women and six children.

The Wesleyan Chapel, a large and lofty quadrangular building, is situate a short distance to the south of the cathedral; and the complaints that were made years ago, of that loud and boisterous singing, disturbing the devout at the cathedral, are well grounded, and as rife as ever. There is also a Moravian church built of iron, presided over by a bishop; and a Catholic chapel, principally supported by the Portuguese.

There are not many well-built houses in St. John's: the houses of some well-to-do planters (town residences) and a few others are tolerably good, and there are some good houses built of brick; and it is remarkable that the latter buildings withstood the shocks of repeated earthquakes without crack or failure, while stone-built houses have been totally destroyed, and brought to the ground; and even many timber houses injured: but I suppose this is caused by the careless manner the masonry is put together, the face and back of the wall being merely cased with stones, and the interior filled in with rubble stone and bad mortar, and with scarcely any bond stone to hold them together; and the consequences are, the walls split with the vibration and concussion; the insides falling one way, the outsides another.

Many of the larger houses are in a dilapidated state, from decay and from injuries received by the earthquakes (particularly the one of 1843), and never repaired; and where the ruinous houses exist,—and they are frequent,—it gives the city a very neglected and forlorn appearance, particularly to strangers.

The houses at Belize are similarly built to those in Antigua, except some have piled foundations, and are frequently erected on brick or stone pillars, so that the air may circulate under and around them. Many of the houses in St. John's are built on brick or stone foundations, as the substratum is good, and the walls are sometimes carried up to the level of the first-floor, but generally a little above the ground, and then raised up on pillars of hard wood (bulley, cinnamon, gregory, locust, moro, ironwood, &c.), or pitch pine of the United States, into which are framed the pitch pine ties and braces, to hold the fabric together, and on which the roof rests. The roofs are generally collar-beam ones, framed out of pitch pine, and covered with close boards and cypress shingle. The front walls are usually cased outside with 1-in. white pine boards, and then covered again with clap boards in 4-in. courses; so the exterior looks like coursed brickwork, except in colour. The interior of the rooms is usually cased in the same way, and afterwards painted or papered. They sometimes use glazed sash windows, with outside shutters and inside jalousie blinds: others have merely jalousies and outside shutters only.

The floors are generally laid with pitch pine boards, matched, grooved, and tongued, which makes a good and durable floor, very far superior to the boards generally used in this country for floors.

The plans of the houses are generally the same as are adopted in other tropical places, viz., with balconies and verandahs in front only, or all

* See p. 665, *ante*.

round, the door leading out of them into the hall, which is in front, and the bedrooms on each side, a central passage at the back. The balcony is approached generally by an outside staircase. The carpenters' work is not first-class, and which, I understand, is gradually getting worse and worse: they have no system of apprenticeship so that the young beginner can be thoroughly initiated into his trade, as they say that looks too much like slavery, and the consequences are, the learner works for a year or so, and then has the conceit to think himself efficient, sets up for himself, and works on his own account as an expert carpenter.

There are several public schools connected with the Church, Wesleyans, and Moravians, and one educational institution established out of the funds of the Lady Mico Charity.

The island is divided into seven parishes, and each has a church, and three chapels of ease in connexion with some of the parishes. St. Peter's, at Parham, is an octagon-shaped, curious-looking edifice; St. George's, a plain rectangular stone building; St. Mary's, a timber erection, of the St. Paul's type; and St. Philip's, a stone building in the Early English style, erected from the design of Mr. Fuller. It was originally intended to have a tower and spire, but that was abandoned from a two-fold cause;—firstly, shortness of funds; and, secondly, the fear of earthquakes, that requires buildings to have broad bases and but little altitude. St. Philip's is unfinished: the roof-timbers are incomplete; and there are no permanent seats or pews fixed. The roof was originally covered with galvanized iron, and being in rather an exposed situation, overhanging Willoughby Bay, a hurricane that took place stripped it off, and crumpled it up as if it had been so much brown paper; so, in consequence, galvanized iron, for roof covering, is not much in favour there. From the rocks near the parsonage-house, one of the finest panoramic views in the world may be obtained. The whole island, which is of an irregular figure, lies before you; the large fortifications of the Ridge and Monk's Hill to the south-west, St. John's Cathedral on the north-western horizon; while the trees and woods that line and cover the rough and craggy summit of the Fig Tree Hill range, break the view of the sea to the south-west.

The heart of the island, green and verdant, lies before you, principally plantations of sugar-cane, with here and there pasture land, frequently intersected with roads, and the numerous houses of the planters, windmills, and sugar-works, embosomed in trees, have something of the appearance of country mansions in England. Below you lies Willoughby Bay, with its alternately light and shaded transparent blue waters, while generally ride at anchor the Droghers, vessels that are employed for the purpose of taking sugar to St. John's for shipment: the whole combined forms a most interesting and beautiful landscape. Another fine excursion and view is to Fig Tree Hill, about the highest summit in the island, probably from 1,000 to 1,200 ft.: it commands a view of the whole island and a considerable extent of the surrounding sea. Guadaloupe, Montserrat, Nevis, Barbuda, and St. Kitt's, may all be distinguished by the naked eye. The winding and tortuous descent of Fig Tree Hill is a landscape of exquisite beauty: the rough and rugged character of the mountains, covered with bush, and a great number of forest trees about the tops and the declivities of the cliffs, and luxuriant festoons, and knots or nets of convolvolus, or other evergreen creepers, connect them all together in one great tracery of branches, leaves, and flowers.

By the side of the road near the summit of Fig Tree Hill is a spring called "Tom Moore's Spring,"—I presume, named after the celebrated poet; but I could never learn whether it was so named or not, or that the poet had ever visited the spot, and had drawn any poetic inspiration from that pure and elevated source.

There are several good mansions in the island: amongst them are "Mount Joshua," belonging to the Hon. Mr. Jarvis; "Cedar Hill" (Sir W. Byron's); "Betty's Hope" (Sir W. Codrington's). Many of the planters' houses are pleasantly and picturesquely situate, and constructed on a spacious and substantial plan, but generally in one style, with balconies, verandahs, and jalousies all round, to exclude the hot sun and provide for the admission of cool air.

A small park or lawn is commonly inclosed around the house, and the sugar-works (which are picturesque at a distance, but very disagreeable appendages close at hand) are so well concealed by trees and bushes as effectually to prevent their being seen from the house.

Beautiful gardens are generally attached to them, for which the floral world of the tropics afford such ample facilities; but the floral vegetation of the tropics, although very gorgeous and majestic, is not so finely diversified and graduated as in England. The scarlet cordia, the pink or rose-coloured oleander, the crimson and yellow hibiscus, the brownish and bright orange feathery-looking flower fence (Barbadoes pride), the plumeria and other jessamines, the white datura and whiter amaryllis, purple wreaths, and white, pink, and blue convolvolus, with endless varieties of other flowers, these many-coloured gems of nature, of massy, deep, and striking tones, are set in beautiful relief by the dark green foliage on which they are surrounded and fixed.

The roads of the island are generally in a good state, except when they are injured by the tropical rains, which are soon repaired, and the inhabitants delight in a species of vehicle called "John Bott," probably after the name of the inventor, and which is simply a gig with a leather top supported on a light iron framework to cover the head, and protect it from the intense rays of the sun, to which curtains are affixed that may be lowered down or not at pleasure, so as to protect the person from sun or rain. They are very nice and useful vehicles, of which I availed myself largely during my stay in the island, and appreciated their advantages.

As a striking contrast between the two colonies Honduras and Antigua, I may mention that at Honduras they had only one carriage (an American waggon), lately imported by a Spanish merchant; while the day after my arrival at Antigua there was a distinguished wedding, in which all the carriages and pairs in the island, I believe, (barouches, curricles, and closed carriages,) were called into requisition, and the black coachmen and footmen were gaily decked out with wedding favours. The negroes always make a great display at their weddings: they sport their carriages and pairs, either borrowed from their opulent neighbours, or hire them, so as not to be outdone by "Buckra."

It happened to be my good fortune to be present at Antigua on the visit of his Royal Highness the Prince Alfred, Feb. 15th, 1861. He arrived in the *St. George*, Capt. the Hon. — Egerton, and accompanied by Major Cowell, R.E. Great preparations had been made to receive him: the houses on the route of the procession had been all newly painted and polished up, and were gaily decorated with flags and various devices, and triumphal arches of all kinds were erected at every available spot in the streets, covered with evergreens and flowers, and suitable mottoes. Photographs of the arches and principal buildings were sent home by the governor to her Majesty the Queen. At Shand's Wharf, where he landed (now called Prince Alfred's Point), he was received by the governor and military in full-dress uniform, the bishop and clergy in full canonicals and other authorities in full dress. The guns at the forts boomed out the royal salute, the band struck up "God save the Queen," and he landed under an elegant tent, the floor of which was covered with scarlet cloth. Every available spot was occupied at the landing-place to catch a sight of the "Sailor Prince:" the beauty and fashion of the island turned out *en masse* to do him honour: the coloured and black ladies tried to outvie the "Buckras" to render him homage; and the delight they experienced to see a real live prince could scarcely be kept within reasonable bounds.

This, I may mention, is the second royal visit they have been honoured with in the memory of living man: H.R.H. Prince William Henry (the late William IV.) once visited them, and a right royal reception, I understand, he met with.

At 4 p.m. a grand levee was held at Government House: the bishop and clergy, the chief justice and bar, and every official and gentleman in the island attended, and it passed off most agreeably and pleasantly to all parties concerned. In the evening, a public dinner was given at Government House, which was well attended by the ladies and gentlemen of the island, and every delicacy of the season that the tropics could afford loaded the tables, and wines of the most *recherché* brands.

After the dinner was over, some beautiful fireworks, with elegant devices, were let off in and about the grounds of Government House, and the celebrated "Tar Barrel Dance" was introduced. A series of negroes, as black as you would wish to see them, form themselves into a procession, each with a lighted tar barrel on his head, and they dance, wind, and curvet about, singing snatches of some negro melodies, or political or other remarks to the tunes: for instance, they sang, "Show him round the town, show him round the town!" Their meaning probably was, that he would see the dilapidated state of many of their houses, or that the streets where they lived, probably back ones, should be honoured with a visit as well as the front or better ones.

The following day the Prince visited Fig Tree Hill and the remarkable places in the island, accompanied by the governor and other officials; and in the evening a grand ball was given at the Court House, at which the Prince, the governor and lady, every official and gentleman and lady in the island attended; and there was a goodly sprinkling of coloured people, and the room was so crowded there was scarcely space to dance.

The Prince's visit was a very successful one: it produced spontaneous demonstrations of loyalty from all classes: every one tried to outvie each other in expressions of attachment to the throne and to the institutions of the country: it afforded the Prince an opportunity of becoming acquainted with the internal resources and peculiarities of our colonies, which may strengthen the bonds that unite them to the mother country.

The geological formation of the islands is interesting: the Caribbean Islands are divisible into two distinct classes, the one occupying the mountainous range on the western sides, exhibiting all the character of recent volcanic action; the other, composing the islands forming the eastern chain, presenting in a more or less regular order the calcareous strata of the upper marine formation, dipping towards the east. The first embraces all the islands on the western side from St. Vincent to Saba: in the latter are comprised Barbadoes, Descada, Grandeterre in Guadaloupe, the northern half of Antigua, Barbuda, St. Bart's, St. Martin's, Anguilla, and Anegada.

Santa Croix exhibits also a stratified formation of the same character, but with an inclination in the opposite direction. It would appear, therefore, to be on the western side of the line of volcanic action. Antigua occupies an intermediate position between these two classes, and partakes, more or less, of the character of each; consequently, it presents an interesting study to the geologist.

It comprises three distinct formations of the tertiary class, of which the most superficial beds occupy the northern and eastern divisions of the island. These consist of calcareous marl and coarse sandstone, interspersed with masses of a tolerably compact shell limestone. The mountainous district forming the southern and western divisions is composed of rock of the newest floetz trap formation, as wache, porphyry, trap, breccia, amygdaloid, and some spherical masses of basaltic greenstone. The intermediate district is occupied by a series of argillaceous strata of varied character. The most superficial consists of a loose friable marl of a yellow colour, with olive-brown spots, containing numerous concretions of a lenticular form; the next stratum being a white indurated clay, of a slaty structure, intersected by seams, which divide it into tabular masses. Inferior to this, we find another tabular rock, of a coarser grain than the last, which, being highly impregnated with green earth, presents a beautiful sea-green or bluish colour. The next, and lowest in the series of the formation, is a stratum of a liver-brown colour and conglomerate character, having embedded in it masses of the different species of the trap family. All these strata dip at an angle to the north and north-east, and extend across the island from the ridge to the neighbourhood of St. John's. The order of stratification is somewhat disturbed by the irruption of a large mass of the trap family at Drew's-hill. This spot is worthy of a more minute examination, for it contains the only marks of recent volcanic action that have as yet been discovered in this island. Streams of lava, some more compact, others vesicular, are found at the base of the hill, bearing the impression of the leaves of dicotyledonous plants. These three formations do not pass imperceptibly into each other, but are divided by well-marked natural boundaries. The southern limit of the calcareous district is formed by a zone of low land, extending from Willoughby Bay, on the south-east, to Dickenson Bay on the north-west, which at no very distant period appears to have been submerged by a

narrow firth, dividing the island into two, like the Rivière Sale of Guadaloupe.

The clay-stone is divided from the trap-formation by the Body Ponds and the stream which issues from them, running towards the north-west through a beautiful luxurious plain. The surface of each district presents also peculiar features. The calcareous is exceedingly broken and undulated, consisting of a series of round-backed hills, of no great elevation, covered with a light arid soil. The summits of these hills are overgrown with the wild sage, loblolly, crotons, and other shrubs. The sides are highly cultivated, and are very productive. The clay-stone formation presents a precipitous escarpment towards the south and south-west, and a gentle declivity in the opposite direction. This is the most barren district in the island, considering that it is everywhere accessible to the implements of industry. The district occupied by the trap formation consists of mountains, some of which rise to the height of 1,000 or 1,200 ft. Others, of the same elevation, are more rounded and less precipitous, affording a good soil for the sugar-cane, even to their very top.

The fossils and petrified wood are pre-eminently beautiful: they are found in various parts of the island by the curious; and there are some fine specimens of the cocoa-nut, and root, and the top of a cabbage-tree enshrined in a bluish-white chalcedony, so that the most delicate folds of the core, and young leaves, were visible as through a piece of plate-glass. Calcareous spar, agates, chalcedony, quartz, and jasper, of various colours abound. Associated with the chert are found great quantities of petrifactions, stems of palm, logwood, cedar, and other woods, and the kinds and different qualities of the woods are distinctly marked, and can be traced.

The agricultural operations of the island do not appear to be very skilfully conducted: sugar is the staple product of the island, and consequently the sugar-cane is the chief business of the agriculturists. On many of the estates they use the old-fashioned plough, worked by oxen imported from Africa, and sometimes mules; but steam-ploughs have recently been introduced on a few of the estates, and this will doubtless lessen the cost of the preparation of the land for the crops, where it can be used, as they appear very cumbrous machines; but I apprehend the great difficulty planters have to contend with is not so much the preparation of the land, as that is only done once in three or more years, but it is the clearing off the crops when ripe, weeding, &c.; and this is the time, when the crop is ready, that Quassy plays his fantastic tricks, for he cannot be induced to labour unless he is paid a price sufficient to enable him, with two or three days' labour, to earn enough to support himself during the rest of the week, and unless that is paid the crops spoil on the ground. The weeding, also, in showery seasons, is an expensive operation, as the cane-field requires to be kept perfectly free from weeds, but the Devil's grass (*Cynoden dactylon*) is the great pest, and has hitherto resisted every effort of the planter to eradicate it.

One of the great evils in Antigua, as in many of the West India islands, is absentee proprietors. In Antigua there are 159 estates, and there are eighty-two resident proprietors, and seventy-seven non-resident proprietors, the business of the latter being managed by attorneys, managers, and overlookers; and there are usually 56,565 acres of land annually under cultivation, but in the year 1861, 24,070 acres only were cultivated.

The islands produce most of the fruit and vegetables indigenous to the tropics; but little care is taken with their cultivation, and a large supply is received from Dominica and other islands. Antigua is very celebrated for her black pine-apples; and the fibres of their leaves are also very useful for manufacturing purposes. The principal trees are the red and white cedar, mahogany (small), logwood, manchineal (this tree has peculiar poisonous properties: if a drop of water from it, after rain, fall on your skin, it will burn and blister you), mangrove, wild almond, tamarind, acacias, sand box, silk cotton, calabash (the fruit of which is large and round: the shell is used for cups, bowls, dishes, &c.,—in fact, the negro's breakfast, dinner, and tea service), cocoa-nut and cabbage trees (scarce), and other trees.

The planters appear to have a deadly antipathy to trees, as they are continually cutting them down to clear the ground for a few additional cane plants; and I believe it is owing to this circumstance that such serious droughts take place in the island, producing at times great distress.

The climate of Antigua is warm and dry: the maximum temperature is 90°, minimum 66°, mean due point 70°. The usual height of the barometer is 30 in.: occasionally it rises to 30·15 in., and falls as low as 29·8 in. The rain-fall is said to be 45 in., but this is very irregular and uncertain. In some years the rain-fall is very slight: at others very heavy falls of rain take place; and in 1861 and 1862 they were remarkably wet years, and 1863 and 1864, on the other hand, were very dry. From February to August or September the cool trade-winds infuse life and health into all creation; and from September to February the weather is changeable, heavy rains and storms occur, and even hurricanes, forty-three of which have visited and devastated this island since its discovery by Columbus. On the approach of a hurricane the barometer falls suddenly from ·50 in. to 1·86 in. below its ordinary height some twenty-four hours before they take place; and this affords the inhabitants a warning, so that they may place their houses, &c., in order, and protect them as well as they can from its sweeping and devastating powers. Antigua is the residence of the Governor-in-Chief of the Leeward Islands, and he is assisted in its government by an executive council and an administrative committee formed from that council.

The laws are framed and originated by a House of Assembly and Legislative Council, the most important of which laws are sent home for approval by the Home Government.

The revenue of the colony is principally raised by import duties, a favourite mode of raising revenue by our colonies; and there is a slight export duty levied upon sugar, rum, &c., to provide immigrants, as the scarcity of labour in favourable seasons is severely felt; while, on the other hand, in dry and bad seasons, labour is too plentiful—in fact, great distress and hardships are suffered: so it is a very difficult question to apply a satisfactory remedy.

The public works of the colony are managed by committees appointed by the House of Assembly, and each committee generally selects one of its own body to take the chief and active superintendence; but not being an expert, he usually appoints a master-carpenter or other tradesman to direct the mechanics and labourers, who are all employed and paid by the day. A mechanic's wages are 2s., and a labourer's from 10d. to 1s. per day: a master-carpenter would get his dollar or dollar and a half per day. This system is found to be a very unsatisfactory way to execute work: it is very costly, as they are always a long time on hand: a mechanic there will not do more than one-third or one-fourth part of what an able-bodied man can do in this country, and they one and all complain that they are oppressed and underpaid. The materials required are ordered of the different merchants, and if they are members of the Assembly, they stand the best chance of obtaining the order. They generally make a large profit by the articles they supply; in fact, they lay on an extra per centage for anything they dispose of to the public.

The laws are administered by a chief justice, assisted by an attorney-general, and a large bar. The barristers in court do not wear the wig—merely the gown and band; and as Quassy is very litigious and fond of law, they usually reap a very large and profitable harvest, and spend it. Generally their dinners and entertainments are of so *recherché* a character as to gratify the most fastidious taste, to which many visitors, both naval and others, can fully testify. The negroes themselves are first-rate lawyers, thanks to emancipation and the march of intellect: they generally throng the courts of law, and are perfectly *au fait* to the points and quirks of law.

In drawing my article to a conclusion, I hope it will not be thought out of place or invidious if I make a comparison between the colonies of Honduras and Antigua,—the former young, vigorous, and flourishing, dispensing with lawyers, and referring all questions of dispute to the primitive and simple process of arbitration; while the latter is old, depressed, exhausted, and all but used up,—the hotbed of litigation: law-suits are the order of the day: the law-courts are seldom closed; and it abounds with gentlemen of the long robe, thriving and prosperous, who, vampire like, drain the life-blood of the island, and leave her to languish and perish.

B. C. E.

ON THE FIREPROOF CONSTRUCTION OF DWELLINGS.

Mr. Henry M. Eyton, architect, has sent the following communication to the Society of Arts:—

In the report addressed to the council of the Society of Arts, entitled "The Statistics of Model Dwellings," one of the heads on which further information was considered desirable, was fire-proof construction, its best examples and their cost.

With the view of adding some little information under the above head, I have noted down some of the many fire-proof inventions, in the hope that in the valuable researches that are now being made by men of ability into the best means of improving the condition of the poorer classes of the population through the salubrity and cheerfulness of their dwellings, the increased danger necessarily attending the aggregation of several families under one roof may claim that share of their attentive consideration which is commensurate with its importance, as most of the improved buildings are now erected with wooden joists and floors, and some with even wooden stairs, built, as stated in an article of the *Builder* of June 7, 1845, and again, November 4, 1848, "as if to burn;"—"houses so arranged that if once on fire there is little chance of staying its progress; being, in fact, a mere bundle of sticks piled up;"—and also, quoting from a pamphlet written in 1775, "that among a society of men so sensible, so learned, and ingenious, there never was a single idea or the plan of an hour's thought adapted to secure the building or family, who were continually surrounded by and living in the middle of combustible wood, from falling a sacrifice to the most trifling accidents of fire; which building and family lieth every night in the year at the mercy of a drunken fellow with the snuff of a candle, a handful of shavings lying in a bye corner, a little thoughtless boy and girl, or a sleepy servant-maid drying linen at the kitchen fire; besides many malicious accidents, to be entirely burnt down and consumed before the morning. Many people wonder that a strong-built house should be so easily consumed; but this wonder ceases when they consider that everything about us is liable to catch fire: our houses are floored, our rooms partitioned, and the roof covered, with fir, a wood full of turpentine, and enriched with two or three coats of painting in oil, besides all our furniture, naturally made of wood, without the least material or contrivance to check the fury of fire, or prevent its rapid progress.

The Building Act merely deals with "Dwelling-houses for separate families containing more than 125,000 cubic feet," which it compels to have fire-proof stairs and landings, and with rooms tenanted by different persons if contained in a building exceeding 3,600 square feet in area, where they are to be divided so far as they adjoin vertically by party walls, and so far as they adjoin horizontally by party arches or fire-proof floors; and although large buildings can be erected without either fire-proof stairs or floors, yet even these two sections are avoided by erecting one building in separate blocks, as was done by Mr. Gibbs, near Victoria-street, and by Alderman Waterlow, in Finsbury. In both of these buildings wood joists and floors have been employed. In all the buildings erected by the Labourers' Friend Society under Mr. Henry Roberts's superintendence, hollow brick arch floors have been used; and in the Portpool-lane buildings this plan has been put to a severe test, as will be seen by the following extract from the *Builder*:—

"Few of the large fires which have lately happened in the metropolis have been so extensive and rapidly destructive as that which has occurred in Portpool-lane; and an examination of the ruins shows the great danger which there is in keeping such immense stores of combustible materials in the centre of a dense population, as are often found.

"Nothing could be more complete than the destruction which in a very short time took place over a large area. On the west side of the area of the fire are the 'Thanksgiving' Model Lodging Houses; on the north, Reid & Co.'s immense brewery; on the south are closely-packed ranges of poor dwellings, every room of which is thickly inhabited; on the east there are houses of a similar class. Fortunately, on all sides, except that on which the model houses stand, there was a considerable extent of walls, without openings, exposed to the raging of the fire.

The Portpool-lane model buildings are fire-proof. The rooms are arched with brickwork; the stairs and railings of slate, stone, and iron; the window-frames were of wood, but these the firemen cut away with their axes. The roof has been partly burnt, and if this building had been constructed on the usual plan, there is little doubt but that it would have been destroyed, for the flames rushed in at the windows, and swept along the ceilings of the rooms. The inmates have been put to inconvenience, but their furniture has not been injured by the fire. In other directions the poor people have suffered, and, what is much to be lamented, thirty-six joiners have lost their tools, which, we are told, on the average, were worth about 30*l.* to each man. In this way 1,080*l.* have been lost, and the calamity will deprive most of these men of the means of providing for their families, for we hear that few had thought of insuring the property on which themselves, wives, and children so materially depended."

It must be universally admitted that to secure comparative immunity from fire in ordinary dwelling-houses is a great desideratum, where even the resident is afforded the security of party walls and parapets of fire-proof material, guarding him from the carelessness of a neighbour. Of how much more importance, then, must it be where no such security exists, with a neighbour above and a neighbour below, all under the same roof, divided by floor joists and boarding of timber, and in some cases with wood stairs. A fire in such a building must inevitably involve a whole number of families in one common disaster.

But not only for this chief reason, the security to life and limb, ought the dwellings of the poor to be rendered incombustible. They should all be sound proof, in order to avoid the annoyance of the noise made by children, and the heavy tramp of the adult over head, wearying and disquieting at all times, but becoming intolerable in time of sickness. The solid incombustible material which would form an effectual barrier against the progress of fire, from its nature is equally a non-conductor of sound, and as perfectly isolates the tenant of one room from the rooms above and below him, as if he were living in an independent tenement.

Another, and not unimportant advantage, is secured by this method of construction. The floors are almost wet proof, and the upsetting of a tub of water does not affect the inmates below. A third advantage is, that all these constructions form no harbour for vermin.

Before proceeding to notice the several systems in existence, it will be well, for the sake of clearness, to classify the different modes of fire-proof construction under two heads, viz., brick, and concrete and iron. Commencing with brick, the most simple system is the half-brick arch. This has been employed at the model dwellings at Birkenhead. The arches were tied together with iron tiles, and abutted in the centre on an iron beam: the spaces between the upper surface of the arches and the spandrel were filled in with concrete, on which flat tiles were imbedded. The arches were 7 ft. span, with a rise of 7 in., forming a thickness at the crown of 13 in. The cost of this system would, including iron girders and tile floor, be about 5*l.* per square; if boarded, and the underside made flat and lath and plastered, 7*l.* 10s. to 8*l.*

Hollow Bricks.

Mr. H. Roberts, in erecting the model dwellings at Streatham-street and Portpool-lane, used hollow bricks, slightly wedge-shaped, 6 in. deep, 4 in. wide at top, 9 in. long, and 1 in. thick, the rise of the arch being ¾-in. to 1 in. to a foot span, set in Portland cement, in the proportion of one part of cement to two parts of sand, the bricks being wetted before use. The weight of the arch was 37 lb. to the foot superficial, and when levelled up with concrete 70 lb. Each arch formed the abutment to the other, except at the extremities, where they were tied in with ¾-in. iron rods, secured to cast-iron springers. Mr. Roberts gives the extra cost of the brick arches at 12s. per cent. on the contract of 7,370*l.*, which would be about 1*l.* per-tenement, or 5s. per square.

On an experiment as to the strength of these arches, it was found that one of the 9-ft. 6-in. span (calculating the greatest weight that could ever be placed on such a floor, if covered with people, at the rate of, 20 lb. per foot superficial), would bear safely four times the weight, and broke down with six times.

Further particulars as to these arches are given in the "Essay on Dwellings for the Labouring Classes," by Mr. Roberts.

Mr. Bunnett has also patented a system of hollow-brick floors, the bricks joggled at the sides, so that when laid and tied by iron rods, they lock together, each brick being in contact with and supported by the six adjoining bricks. This form of flooring has been used at the Grosvenor Hotel and the London and Brighton Railway Station, Pimlico, and can be inspected at Mr. Bunnett's factory, at New Cross. Specimens and drawings can also be seen at the South Kensington Museum, 46m. and 57z., class Building Materials. Mr. Bunnett gives the cost as follows, ready for the reception of floor-boards and plastering to ceiling:—

	Per square of 100 ft. super. £	s.	d.
18 × 13·6	4	0	4
16 × 13·0	3	18	8
15 × 12·6	3	18	6
14 × 10·9	4	4	8
12 × 12·0	3	8	6

Mr. Warren has also a system of flooring of hollow brick. Specimens may be seen at the South Kensington Museum, 45m. and 56z., class Building Materials.

Various other methods with brick and tile have been adopted; and for small spans flat tiles in cement, with iron bonds have been successfully employed, and flat arches of tiles are used in Italy in the South of France; but these require thick walls, to resist the thrust of the arch. Anything out of the common way, however, is almost sure to be costly, on account of the difficulty of finding men to execute the work, and the care and trouble it gives the builder, who consequently charges a high rate, not knowing with certainty what it will cost him to execute.

Among the many systems of the combination of iron joists and concrete, I will commence with that most commonly employed.

Fox & Barrett's System.

The principle adopted in carrying out this system of flooring, is the substitution of wrought or rolled iron joists for the ordinary timber joists, placed about 2 ft. apart, and filled in between with concrete on wood slips. The surface of the floor can either be furnished with the ordinary boarding, or with cement, tile, slate, stone, or other material: the ceiling can be either finished by plastering to the strips that support the concrete, or by fillets secured to the strips and lath-and-plastered. Any required degree of strength is obtained by increased depth of joists and concrete. This system is well known, having been in use for a number of years at most of the new banks, hospitals, hotels, railway stations, private houses, and many of the model dwellings.

The cost of the rolled iron joists is nearly as follows:—

	£	s.	d.	
8 ft. bearing, about	2	0	0	per square.
10 " "	2	10	0	"
12 " "	3	5	0	"
14 " "	4	0	0	"
16 " "	4	18	0	"
18 " "	5	10	0	"
20 " "	6	8	0	"

and from 3*l.* to 4*l.* 10s. extra can be reckoned for the floor and ceiling, depending upon the kind of finish adopted. Mention having been made of the failure of this system at the model Dwellings in New-street-mews, Dorset-square, in the report on the Statistics of Dwelling Improvements, on inquiries I find that the surface was finished with Portland cement, which material has, on experience, been shown to be most unreliable for such purpose, but was unfortunately used in many of the earlier buildings constructed on this principle. Asphalte or lead being the only material now recommended for covering the roofs, care must be taken not to have the ceilings plastered before the concrete is thoroughly dry, or else the ceiling will shell off, and give to the plastering much the same appearance as if mixed with sea-sand. Models of the system can be seen at Mr. Twining's Economic Museum at Twickenham, and at the South Kensington Museum (not numbered). The flooring of the picture galleries there is also constructed on this system.

Beardmore's System.

This floor is constructed of vertical plates of sheet-iron, with angle-iron riveted through at the top and bottom. These beams are then placed on the walls, about 2 ft. 6 in. apart, and plates are riveted to the bottom angle-irons and the space between filled in with concrete or earthen pipes and concrete. This form of construction was evolved by various experiments made by Mr. Fairbairn and Mr. Hodgkinson (reported in the *Builder*, vol. vii., page 104), who determined that the uniform presence of concrete against the whole surface of the web and under the top flanges of the beam would produce the effect of a continuous strut, and thus enable comparatively thin plates to assume the true character of a beam or girder. Mr. Beardmore informs me that he never took any steps to prosecute his patent, on account of his professional engagements; consequently, I am not aware if it has been employed at any buildings. For large spans it offers great strength. The cost for 14-ft. spans would be about 5*l.* per square for the iron, and from 3*l.* to 4*l.* 10s. extra for the floor and ceiling. If placed 2 ft. apart, with wood strips, as in Fox & Barrett's system, the cost would be reduced to 3*l.* 10s. per square for the iron, the weight of each beam being about 1¼ cwt.

Nasmyth's Patent.

This is similar to Fox & Barrett's, only, in lieu of wood strips, iron plates are bent into the form of a segment of a circle, supported on chord or tension bars, which have the ends bent upwards to retain the plates in their curved position when subjected to pressure.

Cheyne's Patent

Is also similar to Fox & Barrett's, only, in lieu of wood strips, corrugated iron plates are bolted to the lower flange of the iron joists. Drawings of this patent may be seen at Mr. Twining's Economic Museum, at Twickenham.

The French Systems.

M. Thuase and M. Creuzot employ rolled iron joists, of a slightly arched shape, placed at a distance of 3 ft. 3 in. from centre to centre, and connected at intervals of 3 ft. 3 in. throughout their length by ties of flat bar iron on edge, resting on the lower flange of the girder, and fastened one to another either by wrought-iron straps or cast-iron chairs: upon these ties are placed square bars, three between each pair of girders, running parallel to them from wall to wall, into which their ends are turned down and built in. On the iron framework the thick plaster ceiling is formed by a wood platform being placed under, whilst the plaster is thrown from above, the former being removed after the latter has firmly set.

In another method the iron joists are strutted, at intervals of 1 ft., by square bars, resting on the flange, and having their ends turned up to the height of the web of the girder.

In a third method, the girders are tied together in pairs at 3 ft. intervals by round iron bolts, nutted at each end. Small square bars are hung on to these tie-bars, three between each joist.

All these methods can be seen in model at the South Kensington Museum, 24, 25, and 26 J., Building Materials, as well as others by M. Bleuze, M. Zorés, and others, which are fully described in the catalogue, and in the *Builder*, vol. xii., pp. 29, 95, and 150.

The following are the prices of M. Thuase's system:—

Bearings. ft.	in.	ft.	in.	Depth of joist. in.	Depth of floor. in.	Weight per square lb.	Price of iron work £	s.	d.
10	0	to 11	6	4	7½	370	2	19	5
11	6	to 13	0	4½	7½	420	3	18	5
13	0	to 16	0	5½	8½	465	3	14	4
16	6	to 20	0	6½	9½	510	4	1	9
20	0	to 23	6	7½	10½	605	4	17	6

The Dennett Arch.

This name is given to a material composed, in part, with either sulphate or carbonate of lime, together with broken calcined cinders, bricks, and other porous material, formed in a soft state, on centreing, into arches of spans of from 5 to 10 ft., and in spaces where larger spans are required the width is divided by girders of wrought or cast iron. The abutments against the wall may either be formed with a cant brick slightly projecting, or laid into the walls. The thickness at the crown is from 2½ in. to 3 in., with a rise of about ¾ in. to the foot. The arch will either form a floor finished with a polished surface, or it may be left rough and paved with tiles, or have a boarded floor. The underside of the arch may be coloured, or ceiling joists introduced to form a flat ceiling. The material is stated to have been in use for the last ten years in the Midland Counties with great success, and it has been used in buildings that have settled considerably, without in any way causing a flaw

or crack in the arch. The advantages of this material are its cheapness, viz., 60s. to 70s. per square, little or no skilled labour being required, and its extreme thinness (about 3 in.) at the crown, consequently reducing the weight on the walls. Not being able to speak of this material from any experience of my own, I cannot do better than quote from a testimonial by Mr. G. G. Scott, who says:—"I have made use of Messrs. Dennett & Co.'s material for fire-proof arching, and though I have, happily, had no practical experience of its efficiency against fire, I can bear witness to its strength and its extreme convenience of application. I have made use of it in positions in which I should have found it difficult to introduce any other fire-proof material; and it has this advantage; that the arches constructed of it are so entirely in one mass that they cover the space like a compact shell or inverted basin, and are, consequently, almost wholly free from lateral pressure." A specimen of the arch can be seen at the South Kensington Museum (No. 47 M., Building Materials), 5 ft. span, with a rise of 2¼ in., 4¼ in. thick at the haunches, and 2½ in. at the crown. A similar specimen is stated to have carried a weight of 5 tons without injury.

Mr. Waterlow's System.

The floors of the landings and passages and the roof in Mr. Waterlow's buildings in Finsbury were composed of clinkers, culm, hard broken coke, and similar rough calcined substances in the proportion of four parts to one part of Portland cement, sufficient water being added to bring the composition to the consistency of ordinary mortar. Bars of 3 in. by ½ in. iron, are stretched edgewise across the building from front to back, at distances of 2 feet apart, and carried into the brickwork of the walls and crossed by ½-inch iron rods 2 feet apart, forming a network of iron with a mesh of 2 feet. A temporary scaffolding is then placed beneath, and the material thrown in to a thickness of 4 inches; in the course of time the whole mass sets with sufficient hardness to allow of the removal of the scaffolding. Mr. Allen, the builder of the houses, states that the floors can be erected for about 5*l.* per square. This construction is similar to the French system without their girders; and taking into consideration that the iron would hardly carry its own weight, that all depends upon the concrete forming one homogeneous mass, and that should any fracture occur the whole would fall, I do not think it is to be recommended.

COMPARATIVE STATEMENTS OF THE FOREGOING DESCRIPTIONS OF FIREPROOF FLOORS, PER SQUARE OF 100 FT. SUPERFICIAL, FOR A SPAN OF 14 FT.

	Thickness of Floors in inches.	Cost. £ s. d.
Wood joists, inch boards, and lath and plaster	11	4 8 6
Same if pugged	—	5 8 6
Brick arch, 4½-in. thick iron girder, use of centreing, and levelled up for tiles	13 & 20	4 15 0
Same if boarded, and the underside levelled, and lath plastered	24	7 0 0
Hollow brick arches. Cost depends upon the price of bricks, which would have to be made specially.		
Fox & Barrett's, with a cement surface	9	5 18 0
Same if boarded	11	7 3 0
Beardmore's boarded surface	11	8 5 0
French systems, about the same as Fox & Barrett's.		
Dennett arch	13 & 3	3 19 0
If tiled	14 & 4	5 0 0
If boarded, and the undersides levelled and plastered	15	7 19 0

The thickness of the floor ought to be taken into consideration, as it increases or diminishes the height of the building. For instance, a building of five stories with brick arches and boarded floor, would require the building to be 5 ft. 5 in. higher than another with Fox & Barrett's system, which, in a building of the size of the Streatham-street Model Lodging-houses, would be about 12 rods, or about 144*l.*

NEW PUBLIC PARK FOR LIVERPOOL.—At the Liverpool Council meeting last week, a special committee appointed to consider the question of providing parks at the north end of the town submitted a report, in which they recommend the purchase of Woodlands and Walton Lodge estates, comprising an area of rather more than 30 acres, at a cost of about 34,000*l.* In order to secure the land in question, it was agreed to recommend the finance committee to purchase it as an investment of capital.

SOME HEALTH MATTERS AT THE BATH MEETING.

IN the section of Economic Science (British Association), Mr. B. Middleton read a paper "On the Sanitary Statistics of *Salisbury*," from which it appeared that the death-rate in 1775 was 30 in 1,000. After 1850 the city was placed under the Public Health Act, and a sum of 27,000*l.* was expended in drainage. For nine years previously to the drainage the average of the death-rate was 27 in 1,000, and for the nine years after the drainage it was 13 in 1,000, or about one-half. For the Close of Salisbury the average death-rate for the same period, before drainage, was 20 in 1,000; and, since drainage, 13 in 1,000. The deaths by consumption for seven years before drainage were 286, and for seven years since only 143. For the last year, 1863, the deaths by consumption were only 11, or 1 in 818 of the population, while for the whole kingdom the deaths by consumption were 1 in 376.

Dr. J. A. Symonds read a paper on the "Sanitary Statistics of *Clifton*." He said,—One of the objects of his paper was to illustrate the importance of explaining statistical figures by statements in words. On the 6th of August last, a severe shock was inflicted on the sanitary sensibilities of Clifton. The figures of the Registrar-General's report were as plain as the Mene Mene on the walls of Babylon, and yet as much in need of interpretation. 24 in 1,000 was the annual rate of mortality in Clifton. The Isle of Wight had only to answer for 15 in 1,000; Newton Abbott, including Torquay, for 16; Cheltenham for 17. 'Why,' asked the Registrar-General, with Rhadamanthian severity, 'is the mortality of Clifton 24 in 1,000?' And the terrible question was asked about Clifton as one of the watering-places. The question would be startling enough to one who had taken but a superficial view of Clifton as to its crescents and terraces, and broad avenues running along or just below an elevated ridge of mountain limestone, and abutting on breezy downs, and resting on a soil which in its nature and inclination is singularly unfavourable to the retention of moisture. The question was still more startling to one who observed how large a proportion of houses must belong to persons in possession of the comforts and luxuries of life, and of the means of preserving health; not less startling to one who knew that a thorough system of public sewage had been completed, and at no small cost to the community. But the surprise of the numerical statement alluded to subsided when it was explained that Clifton, in the Registrar General's Report, did not mean merely the place which he had just glanced at, but Clifton, the watering-place, together with a very destitute district in the parish, and also with a poor-law district, including five other sub-districts, scattered at considerable intervals over an area of 27,199 acres, in some parts densely crowded with the poorest of houses and inmates (a large portion not to be surpassed in their destitution by the tenants of the closest and dirtiest quarters of an over-peopled commercial city or sea-port), those sub-districts making up a population that was almost quintuple the population of Clifton proper. The doctor proceeded to point out the injustice of estimating the rate of mortality in the Clifton union, and publishing it as the rate of mortality of Clifton the watering-place. He pointed out the character of the various parishes which were included in the parish of Clifton, referring to the crowded nature of the dwellings in the out-parish of St. Philip and Jacob, of the existence in the parish of Stapleton of the Clifton Union Workhouse, the Bristol workhouse, and the Bristol Lunatic Asylum; and Dr. Symonds urged that it was unfair to associate the watering-place of Clifton with such districts as those to which he had referred.

Mr. R. T. Gore read a paper "On the Mortality of Bath." The population of Bath, based on the census of 1861, was 52,500, and the mortality for the year ending June 30, 1864, was 1,350, showing a rate of mortality of 25·714 in 1,000—varying from 17·28 in the Bathwick district to 57·09 in the Abbey district. Of the total deaths there were—under 10 years, 41·65 per cent.; from 10 to 60, 29·25 per cent.; from 60 to 100, 28·82 per cent. In the surrounding country districts, with a population of 15,808, the rate of mortality was 20·93; there being, under 10 years, 47·9 per cent.; 10 to 60, 22 per cent.; and 60 to 100, 30 per cent. This statement made by the Registrar-General as to the high death-rate in Bath, had had its effect on the corporation of Bath in taking measures to get rid of the cesspools and other nuisances.

In the same section, Dr. Wilson read a paper "On the Sanitary Statistics of *Cheltenham*." It appeared that within the last ten years the death-rate had varied from 16 to 22 in 1,000.

Dr. Wright, of Cheltenham, pointed out the great advantage that had been derived in some of the lower districts of the town since a better system of drainage had been introduced.

Mr. Field said the population of Bath, by the last census, was nearly 1,000 less than it was in 1841. The rate of mortality in June, 1843, was but little more than 21 in 1,000, but he regretted to find it was now 25·7. He reminded the section, however, how very cautious they should be in drawing inferences from figures, unless they were accompanied with an explanatory statement by which they might correct any error. The speaker went into a comparison of calculations which he had made, which appeared to bring the matter pretty much to what was stated in the paper; and, in conclusion, he called attention to the imperfect drainage of Bath, and the mode by which it was proposed to drain the beautiful villas which were now being built on the Lansdown Hills, and the effect it was likely to have on the springs in that locality.

Mr. Tite, M.P., said, the fact of the high rate of mortality for Bath, as shown by the Registrar-General's return, had had that effect in Bath for which it was meant, and the corporation had turned their attention to a proper system of drainage and of water supply. Experience showed that when they were properly and effectually carried out, a diminished death-rate was the consequence. At the Chemical Section, on the previous day, he endeavoured to show its importance, but he was astonished to hear it gravely asserted there, by a medical gentleman of Leith, that, in truth, a bad smell was no indication of a bad state of things, as regarded individual health; that cesspools were the right system of drainage; and that we ought to return to it because sewage was so valuable. He hoped, however, that the people of Bath would not be turned aside from their present good intentions by any such authorisation. The health of the inhabitants was more valuable than the sewage, and there could not be a greater mistake than the cesspool system, and the sooner it was got rid of the better.

Dr. Farr said the Registrar-General asked why the Clifton death-rate was so high in Clifton Union, in order to get an answer, and that had now been given by Dr. Symonds. The people of this country were in the habit annually of leaving their homes for the various watering-places, both in England and on the Continent, many of the latter being much less healthy than our own watering-places; and in consequence of some lamentable deaths which took place, the Registrar-General was urged to show, if possible, the mortality of the English watering-places, and the consequence was, that it had to be hastily compiled. These places were not over-desirous of furnishing any information relative to the prevalence of any epidemic. Clifton had given a good explanation of the high rate of mortality set opposite to its name in the Registrar-General's return. We were, however, all more or less connected together: and it was impossible for the wealthy people of Clifton to disconnect themselves from the low and wretched population surrounding them and the epidemics which visited them. It was impossible for the rich to isolate themselves from the poor, and the health of all were bound up together. The Registrar-General, in his return, gave his information for the quarter, which he received from the local registrars. He also gives his information yearly, and, again, he will give it at the end of ten years, from which latter date the public would be able to judge of the mortality of the country for a number of years.

On another occasion the injurious views expressed by Professor Bennett, of Edinburgh, who denied that the fermentation, exposure, and smell of sewage were unhealthy, were further combated. Dr. Lloyd, of Bath, opposed them. It had been proved that the smell of sewage was noxious, and in the district near the river in Bath he had long noticed that amongst those who resided there, first came degradation, then ill-health, and then premature death.

Captain Galton said he knew numerous instances of disease from the state of the river Thames.

THE LATE MR. HEAVISIDE, ENGRAVER.

It is with regret we announce the death of Mr. John Smith Heaviside, with whose name our readers will be familiar as a wood engraver, his works having appeared in this journal from time to time over a course of many years. He died on the 3rd instant, in his fifty-third year, at his residence in Kentish Town-road, of tubercular disease of the lungs, after what may be termed but a short illness. He was the second son of Mr. Thomas Heaviside, of Stockton-upon-Tees, builder, and the eldest of three sons of that gentleman who adopted the profession of wood-engraving, all of whom were originally devoted to different pursuits. His next youngest brother, Mr. Thomas Heaviside, was the first to enter the profession, he being one of the earliest pupils of the elder Bonner; and it was by his younger brother that the subject of our notice was initiated into the art,—not until, however, he had attained the age of twenty-six years. After working for some time in London, Mr. Heaviside entered into an engagement with Mr. O. Jewitt, of Oxford, and ultimately embarked in business at that city, in partnership with Mr. Philip Delamotte. Most archæological students will be familiar with the engravings produced by this firm for Mr. Parker's works connected with architecture. Architectural subjects were always Mr. Heaviside's preference and specialty; indeed, his experience as a young man in his father's business rendered him peculiarly fitted for this sort of illustration. It is but two weeks since we published a "cut" of his, part of which was the work of his own hands: thus he may be said to have died in harness.

THE THAMES BANKS.

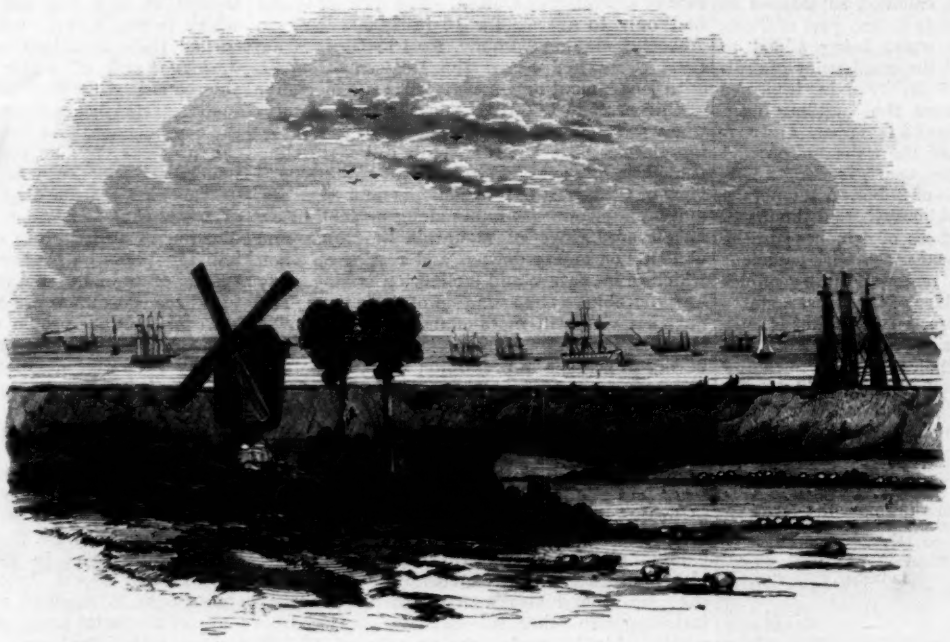
The fact that much of the neighbourhood of London is, like Holland, dependent on its dykes for safety, is so little known, that recent remarks with reference to the injury happily escaped at Belvedere, took most people by surprise.

Notwithstanding that the subject has been treated of at considerable length in different volumes of the *Builder*, and that our account of the recent breach has been widely perused, we think fit to place before our readers, in order that the danger contingent upon a breach may be understood, a sketch which represents what is the general state of the marshes and the river, relatively to one another, and not at the highest level of an average tide. The sketch was taken on the Essex side of the river; but it will equally apply to that side on which the explosion occurred.

It appears that in addition to the favourable circumstances mentioned by us, without which the breach could not have been filled up, and the tide stemmed back as it was, there was the circumstance of an unusually low level of the high-water,—although there were spring-tides at the time. On the 31st of December, 1863, the tide had risen quite 2 ft. 6 in. higher, as registered at the sewerage works: and it is felt by those who directed the works of reparation on the 1st of this month, the day of the calamity, that had the tide on that day been an extreme one, the extra 2 ft. or more would have placed the matter in a still more serious aspect than that in which it was. Everything happened to be in favour of speedy repair,—time, energy of individuals, materials, and every circumstance of wind and tides. But to show we have not been taking too serious a view of the point of the general condition of the banks of the Thames, we may mention that on the date already given as that on which the tide was registered at Crossness,—and when, we may say, the registered level, 15·08 ft. above Ordnance datum, was considerably above that of the Trinity High-water datum,—every time a swell was caused either by steamers passing near the bank, to the west of the works, or by wind, the water went over into the marsh. Mr. Houghton then made up the footpath near to the works, but not on the land of the Metropolitan Board, some 6 in., as a temporary measure, and drew the attention of the Commissioners, and of the Engineers at Woolwich, to the matter.

It appears that the length of the breach, as correctly ascertained, was 120 feet, measured on the footpath. Mr. Webster's men arrived at about 10 minutes to 9 o'clock, a quarter of an hour after the hour of low-water,—the explosion having occurred at 20 minutes to 7. There were 800 of Mr. Webster's men; but only 450 were set to work, the rest being bricklayers, masons, carpenters, and smiths. The military arrived about a quarter to 11.

About 130 of Mr. Webster's men, besides 20 of the Commissioners', were employed to the end of last week, making up the bank with clay punned in layers, as a counterfort to the weight of water, as well as placing stones on the river-face. The bank on the land-side is being formed of a greater width than it originally was: the top or footpath being now about 15 ft. instead of 5 ft.



THE THAMES EMBANKMENT IN THE ESSEX MARSH.

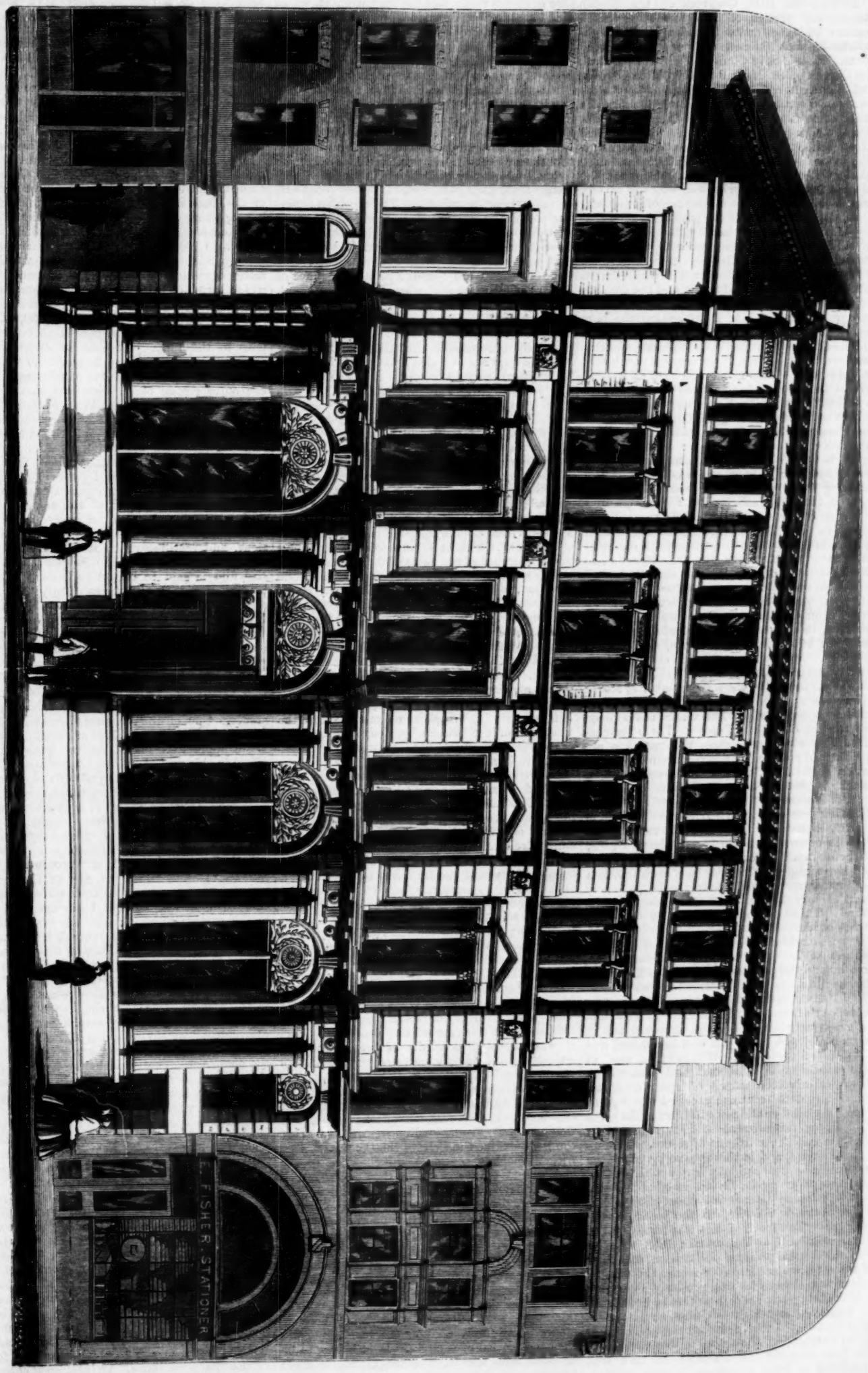
MESSRS. BARCLAY & CO.'S PREMISES, LOMBARD STREET.

Amongst the new buildings now progressing in Lombard-street, to which we have recently pointed, is the new stone-fronted Bank for Messrs. Barclay, Bevan, Tritton, & Co. A view of this building, which is being erected from the designs of Mr. P. C. Hardwick, we have engraved. It occupies a site of 85 ft. frontage on the north side of the street (besides the gateway, which is covered over above the level of the ground floor), and is about 88 ft. deep. The whole of the front part of the office will be devoted to the ordinary business of the bank,—the pay and receive counters, the country office and ledger office being all kept distinct; though, of course, with ready means of communication. Opposite the entrance-door, at the extreme end of the office, will be the principal clerk's office, behind which is a large safe. Near this are the partners' private room, waiting-room, &c. The basement is devoted to strong rooms of considerable size,—rooms for the account-books, and so on.

The first and second floors of that part of the building which fronts Lombard-street will be let. To these there is an entrance from Lombard-street, distinct from the entrance to the bank. The rest of the upper part of the house will be occupied by the principal clerk.

The exterior of this building is arranged with a view to show clearly the object for which it is built. For this purpose the greatest importance and dignity possible are given to the ground floor, which is 22 ft. in height inside. The windows lighting the bank are 12 ft. wide, divided by a mullion. The entrance-door, the jambs of which will be of red granite, will be 7 ft. wide and 14 ft. high. The upper parts of the front are comparatively small from the necessarily lower height of the stories; but the main piers are carried up to the principal cornice at the top of the building, so as to give unity to the whole composition.

In our next we shall refer at some length to the works in Lombard-street generally.



MESSRS. BARCLAY & BEVAN'S BANK, LOMBARD STREET, LONDON.—Mr. P. C. Hardwick, Architect.

STONEHENGE.

During the Bath Congress of the British Association parties of the members visited various buildings and antiquities in the neighbourhood, and listened to papers describing them. Bath Abbey Church, Bristol Cathedral, the Church of St. Mary Redcliff, Wilton Church, and Stonehenge were thus examined. At the last-named, standing on a fallen stone in the inner circle, the Rev. Prebendary Scarth, of Bath, read a paper "On Stonehenge: its Mechanical Construction and probable Uses." He said:—The monument under our eyes at present, I need hardly tell you, is one of the most remarkable in this island, and perhaps I may say in any part of the world. The magnitude of its dimensions, the peculiarity of its position, the obscurity that surrounds its history, and the purpose for which it was reared, render it one of the wonders of our land. Happily, in modern times the indifference with which such structures were once regarded has passed away, and the day has arrived when some of the greatest minds in our country are directed to investigating the purposes, or recording the history, of remains of which our island has justly been proud; and this has been the case with the monument now before us. Acute and discerning scholars, as well as careful antiquaries, have turned their attention to it, and brought both learning and research to bear upon the investigation; and here I feel that I ought to apologise for taking the place of men more learned and better qualified than myself to treat of such monuments, and to state that it has been only in consequence of others declining to do the work in which I am now engaged, that, after solicitation, I have ventured to stand before so learned and so noble an assembly. But that I waste no further time in excuses, and boldly cast myself upon the lenient judgment of my audience (the more learned and wise ever the more tender in judging), I shall proceed to treat of the wonderful monument now before us. And first, as to its structure, you will perceive, on examination of the plan of its construction, that it consists of two circles and two ovals, the two latter (says Hoare) constituting the cell or sanctum. The outer circle is composed of upright stones, originally thirty in number, and on their tops the same number of stones is placed in a horizontal position, so as to form a continuous architrave. The outer circle may, therefore, be likened to a crown. These horizontal stones, which rest upon the uprights, are fixed in this position by a system of mortise and tenon joints. This feature is supposed to be peculiar at Stonehenge. Within the outermost circle, is a second of forty stones of rude form, and much less elevation. Within this again is an oval, consisting of five trilithons, each of which is composed of three very large stones, two being upright, and the third placed upon them horizontally. The weight of each trilithon is estimated at about 70 tons, the impost alone about 11 tons, and set 3 ft. 6 in. deep in the ground. These are held together by the same process of mortise and tenon. The height of the outermost circle of stones is about 13 ft.; but the first pair of trilithons is upwards of 16 ft. high, according to the measurement of Dr. Thurnam, who has illustrated and described this monument with his usual care, ability, and accuracy. The second pair of trilithons is about 17 ft. high, and the great trilithon facing the entrance, one of the stones of which, as you see, has fallen, was 21 ft. 6 in. in height. Within this oval of large trilithons is a second and lesser oval, formed of nineteen stones of ruder construction. The stone commonly called the "Altar Stone" is placed on the earth in front of the great trilithon, and measures about 16 ft. in length by 4 ft. in breadth. An avenue of stones has led up to these circles, and in this avenue by which the structure is approached, at about 200 ft. distant from the outer circle, is an isolated unhewn stone, apparently intended to direct observation, at the Summer Solstice, to the point of the rising sun. The truth of this was tested by Dr. Thurnam himself, at Midsummer, 1858, when he ascertained, from personal observation, that from the stone known as the altar stone, the sun at Midsummer is seen to rise precisely over this stone in the avenue; and from this he infers that the structure in which we now stand was a temple connected with solar worship. The geological character of the stones of this vast structure has occupied the attention of men well calculated to form a correct opinion of their nature; and indeed this learned assembly can this day examine this point for itself. It is, nevertheless, needful first to state that the outer circle and the five trilithons of the outer oval are of sarsen stone, like the grey wethers, which are found in abundance in North Wilts, and have probably been brought from the Vale of Pewsey. They are said to be composed of silicious grit, which is peculiarly compact and hard in its nature, and very difficult to work, as it resists the action of tools, and will split rather than work; and it has, therefore, been supposed that the mortise and tenons have been formed, first by chipping, and then by rubbing the stones with sand and water, and using stone mullers. Considering the rude implements of iron or bronze which the probable builders of Stonehenge must have possessed, this theory does not, to me, appear improbable. The nineteen stones composing the inner oval, and the forty stones of the inner circle, which are less finished in form (though they have been more or less hewn and worked), are composed of igneous rocks, none of which are found within a distance of 100 miles from the spot where they now stand. These stones are composed of Syenite or greenstone, which are not found nearer than Dartmoor or North Wales. I believe it is the opinion generally entertained that these stones were brought from North Wales, and this (as Dr. Thurnam states) may have given rise to the fable related by Geoffrey of Monmouth, that the stones were brought by the magician Merlin from Ireland. There are two opinions respecting the period at which the different series of stones were set up. By some it is thought that the outer circle and the outer oval existed before the smaller stones of the inner circle and inner oval were placed,—by others that the smaller stones were first erected; but if any inference as to the contemporaneous date of the whole structure may be drawn from the chippings of the various kinds of stones of which it is composed being found mixed together at the bases of the stones, and in the adjacent barrows, we are led to assign one date to the whole. What that date may be we are now concerned to inquire. The first author who makes mention of Stonehenge is Henry of Huntingdon, who wrote at the commencement of the twelfth century. He speaks of it as the second wonder of England, and calls it Stanhenges. Geoffrey of Monmouth, who wrote at the same time, declares it to have been a monument erected in the reign of Aurelius Ambrosius, King of Britain, in order to commemorate the slaughter of the Britons by Hengist, and hence the etymology which has sometimes been assigned to it of "Hengist's Stones;" but the true etymological explanation of Stanhenges seems to be (A. S. Stan, used as an adjective, and henge, from A. S. hon), *i.e.*, stone hanging-places, from the stones resembling a gallows. This is the opinion of two eminent Saxon scholars. The name given to it, therefore, by the Saxons evidently shows that it was not set up by that people, who would hardly have bestowed such a title on a work emanating from themselves, and it is no doubt much anterior to the coming of the Saxons. But if Stonehenge was erected anterior to the coming of the Saxons, can we refer the construction to Roman times? We know sufficient of the Roman conquerers of this island to assert boldly that such an edifice cannot be attributed to that people. It was totally foreign to their genius; but to them we may look for some notice of it, or some mention of the manners and customs of the people by whom it was probably erected. Although we have no notice by any Roman writer yet known of any such erection, yet we have notices of the manners and customs of the nations conquered by them, and we have full accounts of the manners and customs of the Gauls and Celtic tribes. From the Romans we know that the Britons, like the Celts of the Continent, were without inclosed temples; but they had groves and sacred places in which they offered sacrifices. They had *loci consecrati*, in which treasures were deposited, the places being dedicated to the divinity, or divinities, supposed to preside over them. Julius Cæsar plundered these sacred spots, and obtained therefrom immense wealth. A.D. 106 Cœpio obtained great booty from gold and silver which had been deposited in certain shrines and sacred lakes. The old Celtic name for a consecrated spot was "nemet." Megalithic circles were in use in early times, both as places of assembly and for sacred rites, before the construction of temples. It is hardly to be doubted that the large stone circles of these islands were the places of assembly and hypæthral temples of the ancient Britons. In Scotland there appears to have been a general tradition that they were places of sacrifice in heathen times. The Gaelic name of "clachan" is equally applicable to a church. They have also the name of law-stones; and there is documentary evidence that as late as the fourteenth century they were used for holding courts of justice. In France, stone monuments seem to have been sedulously destroyed; but they are abundant in Brittany. In our own island they are found in all parts, from the Scilly Isles to the Orkneys, and are always circular in form, and usually surrounded by an earthwork, consisting of a foss and vallum, the vallum being on the outside. The following are the more important stone circles:—Roscawen and Dance Maine, Cornwall; Scorhill and the Grey Wethers, Devon, district of the Damononii; Stanton Drew and Stonehenge, country of the Belgæ. The diameters of the stone circles vary from 60 ft. to 366 ft., and even to 1,200 ft., which is the diameter of the great circle at Abury. The more usual diameter, according to Dr. Thurnam, is about 100 ft., which is that of Stonehenge. The stones which form them are of complete numbers, and seem to have some significance, as 12, 30, 60, 100, by which there has been supposed to be a reference to the lunar year and its divisions, the signs of the zodiac, the 12 months of 30 days and nights. The two inner circles at Abury, the outer circles of uprights and transoms at Stonehenge, the large circle at Stanton Drew, and the circle at Arbor Lowe, are each of 30 stones; those of Rellrich and Stennis of 60; and the large enclosing circle of Abury of 100 stones. These statements, taken from the "Crania Britannica," are, I believe, pretty accurate; but perhaps in one or two cases they may be doubtful. Some of the sacred circles were approached by avenues formed of parallel rows of stones, and are of considerable dimensions, and rectilinear, as at Classernish, Merrivale, and Scorhill. That of Snap was of a large size, and is said to be traceable for two miles. The avenue is traceable at Abury, and most striking at Carnac in Brittany. Abury and Stonehenge are the most remarkable consecrated sites in Britain: both are in Wilts, and are conjectured to have been sites of national congress, where the chiefs and people met the Druids for the settlement of disputes, and the administration of justice. Abury was, probably, in the district of the Dobuni, and is formed of unhewn stones. One of the avenues by which it is approached is a mile and a half in length, yet there is no appearance of the use of implements of metal in this vast structure. Stonehenge is different: it is formed partially of hewn and squared stones. The columnar uprights are connected with a continuous transom or architrave, and by a system of mortise and tenon joints. By the writer of the account of Stonehenge in the "Crania Britannica," the erection is supposed to have been at the period of "bronze and iron transition," *i.e.*, when the age of the use of bronze was passing into that when iron became common. I confess I am not a convert to the system which divides the period of the world's history into eras marked by the use of distinctive metals. It is doubtful if these metals can be shown to have been used in distinct periods, but I certainly agree with the writers of that very learned work, when they assert that it is very probable that when the Belgæ settled in this part of Britain they established a "*locus consecratus*" within the limits of their own territory, of which Wansdike appears to have been the boundary. That Stonehenge is more recent than Abury there can be but little doubt, and it would have been well if this learned congress could have visited that noble monument of a primitive British race, as well as that now under our eyes, and formed some definite idea of the respective periods of the two structures; but it is believed that we are not far from the truth when we suppose Abury to have been the work of an older race, and to have been the place of meeting of confederate tribes of the primæval inhabitants of the island; while Stonehenge is the work of a more recent people, an intrusive race, of similar habits, manners, customs, and creed. That this people were the Belgæ seems probable, and that the period assigned to its erection by learned and competent antiquaries, as the second century prior to the Christian era, is probably correct. This notice of so remarkable a monument would not be complete without making mention of the markings which have been found on one of the trilithons. An intelligent observer, Dr. George Tate, of the Royal Artillery, visited Stonehenge in February, 1861, his object being to search for inscriptions or sculpturing on the

stones, and he succeeded in discovering a symbol, a character on the under-surface of the fallen impost of one of the great triliths of the inner circle. This marking you will have an opportunity of examining. It consists of a hooked figure, bent at both extremities, 7 in. long, having the letters L. V., almost within the upper bend. A representation of it will be found in the nineteenth volume of the *Archæological Journal*, from a careful drawing by Dr. Thurnam. There is not any similar marking on the trilithon which fell in 1797. It has been suggested that the markings may have been cut by a casual visitor to the spot, possibly soon after the fall of the stones, and much time must have been spent in the work; but an argument may be drawn for a more remote antiquity, both from the quantity of lichen which covered the incisions, and had kept them from notice, and the improbability that characters could have been so carefully cut by any casual visitor. A practical observation, in conclusion, may not be here out of place. It will be noticed that two of the trilithons have fallen. The precise period of the fall of one is not recorded: it was prior to 1722, when Dr. Stukeley's views were taken: the other fell in January, 1797. An accurate account of the catastrophe appears in the *Archæologia*, vol. xiii. Would it be well, with permission of the owner, to replace one or more of the fallen trilithons? and could it be considered as interfering with the antiquarian interest of the monument if that trilithon, the fall of which is recorded, and which took place not seventy years since, were replaced in its true position. Again, if the centre of the enclosed area were excavated, with consent of the owner, under careful and judicious management, might not some trace be discovered of the true uses of the structure? Would there be found the ashes of former sacrificial fires? This would be the case if this monument had been applied to sacrificial purposes, or if any interments of the great and noble of the primitive inhabitants of the land had been made within its enclosure; but if none such should be discovered, we should hold fast to the inference that it was destined for public assemblies, religious or political, and councils of state. The engineering skill of modern times would soon effect the replacement of the trilithon, and the keen eye of the modern antiquary would soon detect traces of any particular purpose to which this sacred edifice had been put; and if the so-called altar-stone were raised and replaced, would it reveal anything beneath? We may apprehend not, and perhaps our labour and engineering skill would be fruitless; but investigation would be satisfied with having done her part, and a careful readjustment of its position would satisfy every lover of antiquity. If these suggestions are too bold, or out of place on this occasion, I humbly crave pardon of the assembly, and would further ask them kindly to forgive the length of this notice.

NEW INFECTION-WARDS, ALNWICK UNION WORKHOUSE.

The old Border town of Alnwick has lately been provided with an accommodation that, though still rare, no town should be without. We allude to infection-wards, or places in which persons suffering from contagious diseases can be nursed apart from other patients. An epidemic in a town has, before now, been traced to the instrumentality of one tramp. Bringing the seeds with him from the haunts he has left, he sickens at the workhouse of any town on his route, and being lodged with the usual inmates, several catch his disease, and those waiting upon them spread it without the walls. In such a case as this, if there had been accommodation in which to isolate this tramp, his case would have been a solitary one. Notwithstanding that Alnwick has been sewered, and that water has been laid on to it under the auspices of Mr. Rawlinson, and that it has been paved and periodically swept under the direction of the Board of Health, it has been subject, for successive seasons, to severe visitations of epidemic diseases. These can only be accounted for as the consequences of overcrowding of tenements, and in the absence of a place to which the first person in a family smitten with a contagious disease could be conveyed. Scarlet fever and small-pox have, in several instances, carried off three, four, and five in a room. Could the first person smitten have been removed from the midst of the other occupiers of the tenement, it is possible that the spread of the contagion might have been arrested. To this end the Alnwick Board of Guardians assented to the proposition of one of their body to erect infection-wards, detached from the workhouse infirmary. These have just been completed. The services of Mr. F. R. Wilson, architect, one of the guardians, were secured, and his plans being approved by the Poor-Law Board, London, two commodious wards, one for male patients, the other for female, eight beds in each, with two rooms for the nurses, were immediately erected adjacent to the workhouse hospital.

WORCESTER ARCHITECTURAL SOCIETY.

The eleventh annual meeting and excursion of this society recently took place. The members assembled at the Natural History rooms, Foregate-street, when the chair was taken by Sir Thomas Winnington, bart., M.P., who called upon Mr. J. S. Walker, one of the secretaries, to read the report for the past year. This document extended to great length. After reviewing the excursions and proceedings of the society for the past and present year, it proceeded to detail the new ecclesiastical works in progress or completed in the diocese, with critical comments thereon. The report was received and adopted, and the re-election of officers of the society and the appointment of a committee then took place, after which the party drove to Norton-juxta-Kempsey Church, the first on the programme for the day. At Norton church, the Rev. J. Jenkin, the new incumbent, met the visitors; and, after examining various objects of interest under his guidance, and partaking of his hospitality, they moved on to Stoulton Church, over which the Rev. G. E. Walker, the incumbent, conducted them. The party then went to Pershore Abbey Church, which was the chief point in the excursion. Here the party spent some time, and Mr. J. S. Walker read a paper on the church, and the restorations which Mr. Ball, the churchwarden, has perseveringly aided in carrying out, at a cost of 6,000*l.*, and under the superintendence of Mr. Scott. After glancing at the shocking state of St. Andrew's Church, the party went to Norton Villa, the residence of Mr. G. J. A. Walker, where they dined: after which they returned to Worcester.

METROPOLITAN BOARD OF WORKS.

The Granite for the Thames Embankment.

The Chairman drew attention to a correspondence he had received from Mr. Thomas Scott, of 35, Old Jewry, and he wished the Clerk to read it to the Board.

The Clerk then read the correspondence to which the Chairman referred. It contained an allegation that the officers of the Board had ordered the contractors for the Thames Embankment to use granite from a certain quarry for the facing of the Embankment, to the exclusion of that from other quarries which was of a better quality. It also complained that six samples of granite had been sent in to the Board for examination and approval, and that only three of them had been tested.

Mr. Bazalgette, the engineer, in explanation, said he had adopted the same course in choosing the stone for the Embankment that he had on other occasions. He had examined specimens of stone from Ireland, and had submitted them and others to be tested by Professor Tennent, and he had reported that the granites from Kirkconnell and Dalbeattie were the most uniform in their component parts, and therefore likely to be more durable than the others. He had been accused of having received six specimens of granite, and tested only one of them. The fact was that he had received only four from the contractors, and those he had tried. His office was inundated with granite samples, and it was unreasonable to expect that he should test them all.

The Subways of the Metropolis.

Mr. Carpmael brought this subject under the consideration of the Board, and entered into a history of the efforts the Board had made since its formation to carry out the construction of subways in the metropolis. At present there was nothing to prevent the companies from breaking up the streets that the Board had made, and the question now was whether the Board should have compulsory powers to compel the companies to use the subways. He urged the Board to continue the construction of subways, and leave it to time and public opinion to force the gas and water companies to use them. He concluded by moving that the Board do proceed with the construction of the subway in the Thames Embankment, and with the subway in the new street to the Mansion House.

The resolution was ultimately carried unanimously.

The Progress of the Thames Embankment Works.

Mr. Bazalgette, in his monthly report, said;—As to the Thames Embankment (No. 1 contract) between Westminster and Waterloo Bridges,—The approximate value of the work done and of the materials and plant upon the ground is about 54,000*l.*, or 15,000*l.* in excess of my last report. The contract between Waterloo Bridge and the Temple Gardens is going on favourably. A length of about 120 ft. of the dam is completed and made water-tight, and concrete is being tipped into it up to the level of the underside of the brickwork of the river wall. The estimated value of the works, &c., is about 35,000*l.* The material used in filling in along the foreshore is now entirely confined to that supplied by the Thames Conservators.

FROM AUSTRALIA.

Labour Report.—The last quotations at Melbourne for wages were about as follows:—Masons, 10*s.* per day; bricklayers, carpenters and joiners, and plasterers, from 8*s.* to 9*s.*; painters, 8*s.* to 9*s.*; bricklayers' and plasterers' labourers, 6*s.* to 7*s.*; gas-fitters, 8*s.*: whitesmiths and general smiths, 10*s.* to 12*s.*; blacksmiths, 8*s.*,—with rations, 25*s.* to 30*s.* per week; wheelwrights, ditto, 35*s.*

Ballarat.—This great centre of gold-digging renown is beginning to be proud of its public buildings. The *Star*, a local paper, thus refers to some now in course of erection:—"The new Union Bank is fast nearing completion, and already presents a handsome front. The new Post-office is now up to the cornice in the front elevation, and the completion of the front and east side will soon be achieved. Looking at the temporary endings of the west side and rear of the building, the edifice has a ragged appearance; but the front elevation promises to be a welcome and ornamental addition to the architecture of the town. The Savings' Bank is nearly finished, and its repairs and additions have made it assume quite a new aspect. With less of the ornate in its appearance than it wore before it looks more handsome."

Street Architecture in Melbourne.—The local *Post*, an illustrated paper, in giving a view of new premises in Collins-street East, says,—"It is only a week or two ago that we were celebrating *the thirteenth anniversary of the foundation of the colony;* and when we look back a few years, and reflect upon the then dimensions of the city, and the class and character of the buildings which formerly stood, we may be justly acquitted of hyperbole when we say that no city in the world has made such gigantic strides during a similar period as Melbourne has done; for not only has the city increased in its proportions, but the many fine and substantial buildings which now adorn our principal streets bear ample testimony to the progress which has been thus rapidly made. Any person who visited Melbourne ten years since, and returned during the present year, could not but be struck with the vast improvements which have been effected. In place of the rickety-looking wooden tenements which then existed, there are now elegant and substantially-built edifices, many of them constructed with a uniform design, and these improvements are going on from week to week. In Collins-street, the Regent-street of Melbourne, this change is particularly noticeable. Collins-street East is as much devoted to the mercantile community as Collins-street West is the promenade of fashion.

Telegraphic Progress in South Australia.—The number of telegraph stations which were open in South Australia during 1863 was thirty-six, and the miles of line in operation were 747, with 1,064 miles of wire. The net revenue obtained was 8,429*l.*, and the outlay for working expenses and maintenance of lines was 9,107*l.*, showing a loss of 678*l.*, which is accounted for by the number of unremunerative country stations in different parts of the colony. The business transacted with the other colonies last year produced the following amounts:—With Victoria, 5,085*l.*; with New South Wales, 2,853*l.*; and with Queensland, 188*l.* In South Australia the total receipts were 8,695*l.*, against 8,047*l.* for

1862, and 7,382*l.* for 1861. The stations which pay are, Adelaide, Port Adelaide, Gawler, Kapunda, Clare, Burra, Kadina, Wallaroo, Port Elliot, Robe, Mount Gambier, Penola, and MacDonnell Bay. The stations of Yankalilla, Wellington, and Kincraig just pay their expenses. The extensions during the year were from Kadina to Port Wallaroo, and from Penola to Kincraig.

FROM BRISBANE, NEW ZEALAND.

The Brisbane Bridge, as now contracted for, is to cost 52,000*l.* The length between the abutments on either bank will be 1,030 ft.: the elevation of the roadway at its greatest height above the river bed is to be 70 ft.: it will have twelve piers, and a span of 86 ft.; and its construction will cost 50*l.* 9s. per lineal foot, exclusive of the approaches. Mr. T. Oldham, C.E., has been appointed to make the necessary working drawings and superintend the work, which is being pushed on in a speedy manner. Plans and orders for the iron-work of the bridge were sent home last mail. A new double bridge of iron across the Bremer river, to be constructed for railway and other traffic, has been designed by Mr. Fitzgibbon, and its erection contracted for by Messrs. Peto, Brassey, Betts, & Co. The length of this bridge between the abutments will be 450 ft.: the height of the roadway above the river bed will be 70 ft.: the width of span will be 150 ft.; and the whole will be completed for 19,700*l.*, being at the rate of 43*l.* 15s. per lineal foot, exclusive of approaches. Preparations for the construction of the bridge have been commenced by the contractors. The colonial architect, and the architects of the city, Mr. J. Cowlishaw, Mr. B. Backhouse, Mr. W. H. Ellerker, and others, have various works in hand, such as the Lands and Works building, various stores and shops, banks, villas, schools, churches, and other buildings.

Some little time ago we mentioned the proposed erection of a town-hall in Brisbane with a few friendly comments. The *Queensland Guardian*, when reprinting this, added a footnote containing these words:—

"It is a curious coincidence that the *Builder* takes the same objections to some parts of the design and scheme that were taken in our columns about the time that the contract for the building of the town-hall was let." "Anent the town-hall we have heard some ugly growls by 'those who know' at the rather jerry kind of work that is being done in carrying out the contract; but we suppose that as the *best* professional skill has been engaged by the Municipal Council, the work is first-rate. However, we understand, that when the plasterer and painter have gone over the building, little will be seen for the most fastidious to carp at."

And for this, when the last newspaper left the colony, the proprietor had received notice of an action for libel at the suit of the contractor! We can scarcely suppose that the contractor was in earnest, or that any jury would deny the right of a public journalist to enter so mild a record of opinion in a matter affecting the public purse.

SANITARY MATTERS.

Fever Epidemic at Westminster.—Scarlet fever of the worst kind has been very fatal round about the Abbey. In one family, three persons have died; and other bad results give just cause for anxiety. An artist who was much engaged in sketching in this neighbourhood in Dean Buckland's time, writes respecting the bad condition in which the drains were at that time, and gives some account of the endeavours which were then made to set those matters right. He asks if this was effectually done in connexion with the school and other buildings, some of them very inconveniently arranged, which stand about here? He also inquires about the water supply, and wonders if the old conduits are still used, or the water obtained from a more pure source. The present circumstances still require that sanitary inquiry should be made here.

State of Hastings and St. Leonard's.—It is satisfactory to observe that the sanitary state of our watering-places is now exciting attention. The bad practice of allowing the sewage to escape from the sewers on the beach before the town, and even above low-water mark, so that the water used by bathers is contaminated with it, has on various occasions been reprobated in the *Builder*. It is, moreover, a suicidal practice, as regards the prosperity of a watering-place. A writer in the *Times* complains of Hastings and St. Leonards-on-Sea, which have long had a bad pre-eminence in this respect, as those will believe who recollect of the fatality to a well-known family years since recorded in the *Builder*. The writer alluded to says:—

"At comparatively short distances long lines of cast-iron sewage pipes ornament the beach both of St. Leonard's and Hastings, and most of them discharge their contents considerably above low-water. Between these are the bathing grounds. Sometimes the water is discoloured for a considerable distance beyond and around the mouths of these disgusting pipes. It is even reported that instances have occurred in which ladies after a sea bath in the morning have been obliged to resort to a disinfecting ablution at home. The idea of bathing in the immediate proximity of sewers is horribly disgusting, to say nothing of the actual effect. While dining at a house in Robertson-place the other night, the fœtid emanations of the great sewer-pipe opposite were very evident at low water.

The people at Eastbourne seem to be striving in earnest to remedy every defect which has been alleged against their town. I was there a few days ago, and saw not a single sewer discharging its noxious contents into the sea immediately in front of the houses, and all among the bathing-machines, as at St. Leonard's and Hastings. I write these remarks, Sir, with the view of stimulating the authorities of the two latter towns to immediate action."

Fever at Sowerby.—Attention is being called to the unhealthy state of Sowerby, fever being exceedingly prevalent in that village; and it is added that such is sure to be the case until the place is thoroughly and effectively drained. Some four years ago a stir was made in this matter; but on the question being brought to poll, a large majority declared against any improvement, and they (and others) are now reaping the fruits of their obstinacy.

High Rate of Mortality at Rotherham.—The statement made at the last meeting of the local Board of Health, by their medical officer, in reference to the high rate of mortality in the districts appears to have created some alarm. Bills have been thickly posted about the town, by order of the Board, threatening any person with proceedings who shall offend against their by-laws, and allow rubbish of any kind to accumulate on their premises. The only objectionable feature in the order is that the scavengers will be prosecuting their duties in the middle of the day.

Health of Sheffield.—Rumours have been rife for some time of the prevalence of fever in this town, and some alarm has been excited in the public mind of an impending epidemic. Inquiries made by the local *Independent* show, that whilst there has been a considerable amount of sickness, it has not been of a more than usually serious character, with the exception of one or two particular localities which are unfavourably situate. The protracted drought has converted the beds of the streams that pass through the town into stagnant ditches, and the people living along their banks might be expected to be peculiarly affected by the bad sanitary condition with which they are surrounded. The medical men are able to trace the prevalence of fever directly to the condition of the bed of the Sheaf, which receives the drainage of the houses, and is nothing more than a huge cesspool, emitting an abominable stench. It is to be hoped that the condition of the houses and the stream will receive prompt attention, or a more formidable evil may arise.

Liverpool.—From a report to the Health Committee, it appears that 1,714 houses in the unhealthiest districts, containing 4,560 apartments, 1,096 cellars, 731 courts—(north district, 696 courts; north-east district, 552 courts; central district and south district, 756 courts)—have been put under examination with the view of improving their sanitary condition. The medical officer of health reported that the number of deaths registered in the borough during the week ending October 1st was 261, or 162 in the parish, and 99 in the out-townships, being five below the corrected average of the last ten years. Zymotic diseases caused 88 deaths, being 10 below the corrected average. Mr. Stitt said he was sorry to see that, though the total deaths were 10 below the average, the fever cases were so high as to be 16 above the average. He asked the borough engineer when he would have the plans ready for disinfecting the clothes of those who had been attacked by fever or other infectious diseases, by the employment of dry heat. The borough engineer replied that two sets of plans were ready, and had been submitted to the committee. He was now preparing plans for one mode, which bore on the face of it its own recommendation, and which was to secure the desired object by means of gas. The deputation to the Social Science Congress presented a long report upon "The Utilization of Sewage," "The Overcrowding of Houses," and "Infant Mortality." The principal facts mentioned in the report were:—1. That no known chemical agent exists for thoroughly purifying sewage, nor is there any mechanical or other agency for profitably consolidating it. 2. That under certain conditions sewage may be utilized by applying it to the land, which is its natural purifier. 3. That it can be only advantageously applied in a liquid state, and must accordingly be conveyed to the land by means of conduits and pipes. It was said to be fully proved that the application to clothing, &c., of dry heat, of 150 degrees to 212 degrees Fahrenheit, is effective as a disinfectant. A resolution was passed recommending the Association to use their best endeavours to induce all local authorities to establish public disinfecting chambers, as contemplated at Liverpool.

Increase of Fever in Leighlinbridge (Carlow).—Owing to a very considerable increase of fever in Leighlinbridge, according to the *Carlow Sentinel*, a special meeting of the dispensing committee of the district has been held, and a sanitary officer appointed and other steps taken for the sanitary improvement of the town.

A COMPETITION IN BELGIUM.

The Belgian competition announced in the *Builder*, and in which a premium of 300 francs was offered by the guild of St. Thomas and St. Luke, for the best design for a parish church, has just been decided; the adjudication being made by a jury of archæologists and architects, who have awarded the prize to Mr. W. C. Brangwyn, of London, architect.

WIDE TENDERING.

In reply to "Farnhamensis," Mr. W. Elliott, builder, denies that he "recklessly cubed the building at 1s. 4d. per foot," and goes into particulars for which we have not space. He shows that the drawings were given in a way to lead to differences of opinion;—further that,—

"There were no detail drawings: the architect was to supply them afterwards; and the contractor was to execute them, whatever they might be, to his entire satisfaction. The architect or his client had the power to enlarge the house or premises to any extent; and payment of such increased works was to be entirely left in the power of the architect;—no arbitration clause permitted, and no alterations to be made without a written order, which can seldom be got, and is often taken as an insult by architects when asked for such an order. Where the quantities are taken off, the parties receiving the benefit should be made responsible for them. I would much rather trust to cubing when I can see the drawings and specification, than take for granted the quantities as given by three-fourths of the surveyors who take them off where tenders are advertised for."

GLAZING.

Sir,—In March last I removed a quantity of old wood sashes from freestone window-frames, and substituted plate glass in lieu thereof. A groove, 1 in. in depth by 1½ in. wide, had been cut in the stone mullions and transoms, for the reception of styles and top-rails of old sashes. The plate glass is inserted in this groove to the depth of about ¼ in., and made good with Portland cement. Within the last few weeks three (out of about eighty squares) of the glass have cracked. I was at first inclined to attribute this to expansion or contraction; but it has been exposed to a great variation of temperature previously to being cracked.

Can any of your readers inform me what is the real cause of the glass giving way, and suggest a remedy? Would a more elastic stopping than Portland cement remedy it; and if so, what kind of stopping? W. B.

A NEGLECTED CITY ON THE SEVERN.

Perhaps few places with an equal number of inhabitants are progressing slower than the most important upon England's noblest river—the Severn. With a position unsurpassed for beauty and healthiness as well as convenience, a charming old city is in a state of comparative stagnation. In every direction cottages and villas are not in course of erection. Go north, south, east, or west, and the merry tinkle of the bricklayer's trowel salutes not your ear. The beautiful hills that surround it seem provided by nature for the reception of most delightful residences, which stand neither upon their summits nor bases. Progress as slowly as possible seems the order of the day. "Let us have our suppers and go to bed," is in the mouths of young and old. A short time since this somnolescent city rejoiced in the possession of a beautiful arboretum; but, lest the grass should grow upon its gravel walks, it was sold by auction to an enterprising lawyer. In its very centre stands a music-hall, which is filled only when it is opened gratis, and within this musty edifice,

which looks like a Brobdignagian's tomb, stands a dirty deal piece of framework, which tradition says is an organ. Not a quarter of a mile from this ugly fabric is what is called a theatre, which may be known by the absence of a splendid portico, and by a beautiful whitewashed façade, unbroken by any cornice, string, recess, aisle, or ornament whatever, excepting really inconvenient apertures, the only means of ingress and egress; but a fuller description of it would be honouring it too much. Within speaking distance of the theatre, and in the same angelically paved street, stands about as sad a specimen of modern art, in stucco, as can be found in any corn exchange in England. Among the 35,000 inhabitants of this city on the Severn, there are several architects,—at least, if door-plates are to be believed,—but what erection, save the cathedral, the guildhall, and a new bank, there is worth the brain of an architect few can tell. Yet there are no speculating builders in the place, and if the houses were ever designed at all, they must have been done by the architects. As one rambles about the place one cannot help remarking the noble terraces and vast squares, as well as splendid crescents that are not appearing in every direction. New roads are not being staked out, and narrow streets as well as filthy alleys, are rapidly not giving way to modern improvements. The mechanics' institutions that are to be found in every place of 10,000 souls have a noble representative not here, and the public baths and washhouses are blessings the people enjoy not. At Shrewsbury one might take a boat, and voyage down this Rhine of England, and his arrival at what should be a port will be known by the absence of crafts of the same nature as the one that bears him over the placid surface of this noble and much neglected river.

A Lover of Progress.

SURVEYORS AND TOWN COUNCILS.

I have read the letter signed "Fairplay" (in your last number) on the surveyorship of Weymouth, and the paltry, inconsistent conduct of the town council. I am fortunately not one of the thirty-two competitors for *advertised position* which had already been pre-determined on as to who should fill it.

It has now become a disgraceful farce of town and borough councils advertising for the tried and proved abilities of educated, trained, and effective men of business, as engineers, surveyors, and managers of works, wherein they are expected to conduct themselves as gentlemen, and maintain appearances as such on a pitiful stipend—for it cannot be called a pay or salary—which a journeyman London mechanic would refuse. The highway surveyorship of the Croydon district is a sample of these disgraceful offers, in the last *Builder*. So is the Lavenham district, in which the assistant surveyor is to keep his horse at *his own expense* (I suppose on road-sweepings or sawdust), and for the munificent stipend of 100*l*. And lastly, the "Tyldesley with Shakerly" district, wishes to secure an engineer, surveyor, and clerk, or what I should call a Trinity man—three in one—for 130*l*. per annum.

Nothing but a severe lashing in the *Builder* can alter this wretched state of affairs.

Civil Engineer.

FROM SCOTLAND.

Castle Kennedy.—The foundation stone of the new mansion of the family of Stair has been laid by Viscount Dalrymple, in a field on the lands of Inch Park, adjoining the pleasure-grounds of Castle Kennedy. Messrs. Brown & Wardrop are the architects; Messrs. Arch. Murray & Sons the masons; Mr. W. Alexander the joiner; and Mr. A. Pinkerton the clerk of works. After the ceremony, the builders and men employed on the work, to the number of nearly one hundred, were entertained at supper in the King's Arms Hotel, Stranraer, Mr. Murray, builder, in the chair; and Mr. Pinkerton, clerk of works, croupier. The building is to be in the Scottish Baronial style of architecture, and will have a frontage of 270 ft. The principal feature will be a massive square tower, which rises from the south-east corner to a height of about 90 ft. above the surface. The entrance is from the north side: the public rooms face the south, commanding picturesque views of the two lochs and their islands, with the fine old ruin of Castle Kennedy and its green terraces rising between them. The new castle will be terraced on the south side, having stone balustrades and broad flights of steps leading to the shrubberies and dress grounds. The walls are being built with whinstone from the quarries at Glenluce, faced up with freestone of a cream colour, from Lancashire.

Oban.—St. John's episcopal church, at Oban, has been consecrated by the Bishop of London, acting for the Bishop of Argyll and the Isles. The building has been erected near the northern extremity of the town of Oban, and on one of the best sites in its beautiful bay. The church is of small dimensions, consisting only of a nave and chancel, the total length being 61 ft. inside. The gable next the sea is pierced with a rose window, and the chancel end with a triplet with traceried top. The windows in the flanks of the nave are lancets. The roofs over the nave and chancel are open-timbered; the ceiling between the spars of the roof being painted with diaper patterns in colours. The design requires a belfry to complete it. The chancel is laid with encaustic tiles. The east window, of painted glass, is the gift of Sir Donald Campbell, bart., of Dunstaffnage. The rose of the western gable has been also filled with painted glass, the gift of Mr. David Hutcheson. The lancets beneath the rose window contain memorial windows, erected by Mrs. Campbell, of Lerags. The committee applied to the late Mr. Charles Wilson, architect, for the plans for this church, but owing to his death they were subsequently intrusted to Mr. David Thomson, now of the architectural firm of Messrs. Heath Wilson & Thomson, of Glasgow. The contractors were Messrs. J. M'Corquodale, mason; W. Menzies, joiner; A. Fairgrieve, plumber; H. Brown, slater; G. M'Alpine, plasterer; C. M'Laren, glazier; R. Ferguson & Sons, painters; G. Smith & Co., ironworkers. Mr. J. Hay has fitted up the heating apparatus, and the stained glass has been executed by Mr. Wailes, of Newcastle; Messrs. Cox & Son, London; and Messrs. Hugh Bogle & Co., Glasgow. Mr. T. Duncan was the clerk of works. The entire cost of the church has been about 1,400*l*.

Newhaven (near Edinburgh).—The Newhaven fishermen have resumed their labours in bringing stones from Queensferry, towards the completion of their harbour, since their return from the Dunbar herring fishing. The plans and specifications, prepared by the Messrs. Stevenson, engineers, Edinburgh, have been laid before a number of the fishermen for their inspection. The fishermen are unanimous to go on with the work, and it is understood that the Provost of Leith will lay the plans and specifications before the dock commission and the town councils of Leith and Edinburgh, with the view of getting pecuniary aid from those bodies to complete the new harbour. The fishermen have to lay some 6,000 additional tons of stone on the breakwater, when their part of the work will be nearly completed.

Skipness.—The heritors of the parish of Saddle and Skipness, near Campbelton, have found it necessary to repair and alter Saddle Church. The last-named architect has prepared drawings for partly rebuilding it.

PROVINCIAL NEWS.

Liverpool.—The proceedings of the markets committee, laid before last week's council, contained the following recommendations:—1. Recommendation to authorise the improvement of the north and south ends of St. John's Market, upon the principle shown upon the plans submitted; and also for providing a new roof for that market, the total estimated cost being 16,200*l*., the consideration of which subject was postponed at the monthly meeting of the council in August last. 2. Recommendation that application be made to Parliament in the next session to acquire the property referred to in the surveyor's report to this committee, as No. 1 on plan, and coloured pink and green, and to appropriate the same as an enlargement of the hay-market, and as the site of a wholesale vegetable market, at the estimated cost of 83,000*l*., including the widening of streets and the removal of St. Anne's Church, in order to provide proper access, but exclusive of the cost of works. The consideration of the recommendations was deferred.

Scarborough.—The town council having received a report from the borough gaol committee, consisting of an abstract statement of the several estimates that have been sent in from contractors for the work of erecting the new gaol, and showing that the highest estimate for the entire work was 15,990*l*., and the lowest 14,323*l*., a discussion followed, the mayor observing that, as the estimates had exceeded the anticipations of the council, the question now was, should they proceed with the work or postpone it? He believed it to be practicable to modify the specifications so as to reduce the cost; but then came the question as to how far such modifications as they might make would meet the views of the Secretary of State. Mr. Voules, the Government inspector of prisons, had promised to spend two or three days with him, when his opinion on the matter might be obtained: at his suggestion, therefore, the meeting was adjourned. When first considering of the probable cost of the gaol, the mayor remarked, they thought about 10,000*l*. would meet it, including the purchase of the land; whereas they now found that it would amount to 18,000*l*., without such extra items as usually turn up in such a work.

Worcester.—Alderman Lea's Almshouses are nearly completed. The houses are in close proximity to the schools recently founded and presented to St. Nicholas parish by the same gentleman in the Infirmary-walk. The almshouses are six in number, and are built of brick, with Bath-stone facings, the front elevation being varied by dormer gables for the bed-room windows, and lines of black bricks indicating the arches of doors, windows, &c. A steep-pitched roof is surmounted by ornamental ridge tiles. The doorways have pointed arches and Gothic iron hinges to the doors; windows square-headed and transomed, and the glass set in cast-iron work, lozenge-shaped. At the base the walls are 18 in. thick, and decrease to 14 in. and then to 9 in. at the top, and the whole work has been done under the direction of Mr. H. Rowe, architect; Mr. O. Wilson, of Worcester, being the contractor. The cost will be about 2,000*l*.

Nottingham.—The tenders submitted by the builders were opened at the offices of Messrs. Jackson & Heazell, architects, for the erection of a new warehouse and show-rooms in St. Peter's-gate for Mr. William Keeling, when that by Mr. R. Willimott was accepted. The new buildings will be 90 ft. long by 30 ft. wide, and when completed the whole length of the ground floor, shops, and sale-room will be 137 ft. The front to St. Peter's-gate will be set back in a line with the new County Court buildings, and will have plate-glass windows nearly the whole height and width of each story on the ground and first floors. Internally, above the basement story, the building will be constructed with wrought-iron girders, thus avoiding the necessity for iron columns.

West Hartlepool.—A new Masonic Hall has been founded with the usual ceremonial, on a site near Christ Church, and at the head of Church-street, the chief thoroughfare in the new town of West Hartlepool, and according to a design by Bro. John Tilman (P.G.A.), of Sunderland, architect, the contractors being Brethren J. Johnson and Jonathan Salmon; and the estimated cost of the building upwards of 600*l*.

CHURCH-BUILDING NEWS.

Sherbourne (near Warwick).—A new church (All Saints') has been constructed here by Miss Ryland, of Barford-hill, formerly of Birmingham, and has been consecrated by the bishop of the diocese. The architect was Mr. Scott, and Mr. Huddleston, of Dublin, the builder. Mr. Farmer, of London, has executed the carvings. The church, which is Gothic and built of Bath stone, is internally divided into a nave, north and south aisles, and chancel. Arches divide the aisles from the nave. The pillars spring from clusters of polished marble. Over these are the clerestory windows, with marble shafts, the corbels representing angels in an attitude of devotion. All the capitals are carved. The roof is open, darkly stained and polished, and the seats are open benches, with reclining backs.

Wishford (Wilts).—The Church of St. Giles, Great Wishford, has been re-opened by the Bishop of Salisbury. The church, which was an ancient structure, being in a very dilapidated state, has been restored, principally at the expense of the Pembroke family. The architect was Mr. T. H. Wyatt. Mr. T. Miles, of Shaftesbury, was the contractor; and the works were carried out under the superintendence of Mr. J. Harding, of Salisbury. The carvings, which are Naturalesque in style, were executed by Mr. Sansom, of London. Mr. Walker, of London,

has received an order for a new organ, but it is not yet completed.

Congresbury (*Somerset*).—A new church, dedicated to St. Ann, and situate at Hewish, in the parish of Congresbury, has been consecrated by Baron Auckland, the Bishop of Bath and Wells. The church has been built at the sole expense of Mr. R. Phippen, of Bedminster, on a spot near where the parishes of Wick St. Lawrence, Yatton, Congresbury, Puxton, and Kewstoke converge. The site extends over about two acres, and it has been presented by Mrs. Rooke, of Frenchay. The church has been built in the Early English style, the plan being cruciform. It comprises a nave, with south porch, chancel, and organ chapel, and vestry on the north side. The north and south transepts project from the crux, which is groined in wood. On the north is a circular bell-turret, surmounted by a gilded cross. The interior of the church is paved with Staffordshire tiles. It is seated with open benches, which will accommodate 250 persons, all free. The chancel is a circular apse, containing thirteen windows, the centre of which contains the Salvator Mundi, the twelve supporting windows containing each a figure of one of the apostles. The windows form an arcading inside, resting on slate columns, and were painted by Mr. O'Connor, of London. The chancel is lined with Bath stone throughout. The roofs are open, and the nave arched and panelled. The chancel is divided from the tower by a stone arcaded screen. The edifice is built of limestone from the Worle quarries, with Bath stone dressings. The roof is covered with Bridgwater tiles. In the turret is a bell, manufactured by Messrs. Llewellyn & James, of Bristol. In a niche over the south transept door is to be placed a statue, carved in stone (by Mr. Farmer, of London), of St. Ann teaching the Virgin to read. The church has cost about 2,500*l*., and Mr. Phippen is about to commence the erection of a glebe house contiguous to the church, at an additional outlay of about 1,200*l*. The establishment of schools is to be a subject of after-consideration.

Nottingham.—Two churches, St. Saviour's, Arkwright-street, and St. Ann's, St. Ann's-road, have been consecrated. St. Saviour's is from a design by Mr. R. C. Sutton, selected in competition. The edifice is in shape a parallelogram, and consists of nave and aisles. The chancel is situate in the east end, with a vestry at one side, an organ chamber, with a stone floor, on the opposite side. The dimensions are,—Length of nave, 74 ft., and width, 24 ft. The aisles are each 74 ft. long and 17 ft. wide; and the chancel is 30 ft. deep by 24 ft. wide. The height of the nave is 46 ft. A corbelled moulded arch divides the nave from the chancel, and the aisles are divided from the nave by arcades, supported on octagonal piers with carved caps. For the purpose of increased strength, brick arches have been introduced over the arches in red and black courses. Above these arcades is a clerestory, pierced with twenty segmental triangular windows. The roofs are of open timber work, chamfered, the spandrel being filled with tracery. The style is Geometrical. A five-light window is placed in the east end of the chancel, with decorated traced head, and two-light windows, with a wheel window, occupy the west end. A tower, of three stages, is placed at the western extremity of the south side of the church. The base of the tower is 16 ft. square. The height of the spire is about 110 ft. The carving throughout is conventional, by Mr. Earp, of London. The material used in the erection of the edifice is dressed Bulwell stone, with dressings of Ancaster stone. The plumber's work has been done by Mr. Corden. The church provides accommodation for 731 persons on the ground-floor, and the cost is about 3,100*l*. The work has been carried out by Mr. J. Barker, builder, Nottingham. St. Ann's Church is of the following dimensions:—The nave is 80 ft. long and 25 ft. wide; aisles, 80 ft. by 13 ft.; chancel, 22 ft. by 20 ft.; vestry, 15 ft. by 12 ft. The church will accommodate 750 persons. The design is Early Decorated, the whole of the windows throughout being filled with geometric tracery of different patterns, no two windows being alike. There are five bays to the nave, and the capitals of the eight columns and four responds are filled with natural foliage. The whole of the windows and doors throughout have stone dressings in the inside as well as the outside. The seats are of a plain character. Mr. Clarke, of this town, is the architect. Messrs. Haw & Wool were the builders; and the various stone and wood carvings have been executed by Messrs. Pearse, Mee, & Smith. Mr. H. Spooner was the clerk of the works for this church, and also for St. Saviour's. The church affords 822 sittings, of which 290 are appropriated, and 532 free,—284 for adults, and 248 for children. The cost was 3,100*l*.

Mirfield (*Yorkshire*).—St. Saviour's Church, Ravensthorpe, Mirfield, has been consecrated by the Bishop of Ripon. The church stands on the south side of the Dewsbury and Elland turnpike-road in Mirfield. It will accommodate 500 persons, 350 adults and 150 children, all free. The style is of the fourteenth century. The church consists of a nave and chancel, divided from the aisle by pillars and five arches. Both nave and aisle have high-pitched gabled roofs: the latter is continued to the extreme east end, forming an aisle to the chancel. The estimate, we understand, was 1,927*l*. for all the expenses of the church and boundary walls, &c., excepting the site. The architect was Mr. J. A. Cory, of Carlisle, who some years ago built Hopton Church, in the adjoining district.

DISSENTING CHURCH-BUILDING NEWS.

Crewe.—The corner-stone of a new Unitarian Chapel has been laid in Beech-street, Crewe. The style will be Gothic, and it is estimated to cost, exclusive of the land, 1,100*l*. Its length is 54 ft. by 33 ft., and the seats will be open stalls, affording accommodation for 240 people. There is to be a platform pulpit at the north end, and an organ platform at the south end. The height of the wall to the naves will be 18½ ft., centre of roof from floor 42 ft. The roof will be of open timber, spring rafters, resting upon carved stone corbels. The walls inside, from the base line, will be plastered with rough stucco, and jointed to represent stone work. The aisles will be laid with Messrs. Minton & Co.'s encaustic tiles. At the sides, the chapel will be lighted by four pairs of lancet windows, glazed with cathedral glass, and the body of the building will be red brick, with buff facings and cornice. The roof will be covered with Bangor slate, worked into a Gothic pattern. At the north end there will be a school-room, similar in style, 33 ft. by 20 ft., separated from the chapel by three Gothic arches, springing from hexagon pillars filled with single brick walls. The entrance will be lineable with the front side, and will be similar to the entrance to the chapel. For heating purposes, slow combustion stoves will be employed. The architect is Mr. J. W. Shufflebotham, of Crewe.

Bridgwater.—The new Congregational chapel in Fore-street, Bridgwater, has been opened. The style is Geometric Middle Pointed. The whole of the work has been executed from the design and under the superintendence of Mr. Down, of Weston-super-Mare, architect, by Messrs. Shewbrooks & Son, of Taunton. The sculptured portions of the building have been carried out by Mr. Hurly, Taunton. The building will accommodate 1,100 hearers. The cost has been 4,500*l*.

Scarborough.—The foundation stone of the new Congregational Church, on the South Cliff, has been laid by Mr. Titus Salt. The edifice is in the form of a T, with nave, side aisles, and transepts. It is to be built in the Decorated style. The front faces Oliver's Mount, and the tower and spire at the south-west angle rise to the height of 160 ft. immediately opposite one of the streets which leads to the Esplanade. The main entrance is a double doorway, with shafts and hollow moulding, and a single light window on either side. Above is a rose window. The windows in the side aisles are of three lights, executed in stone. In the clerestory the windows are triangular, filled in with tracery. The transept windows are of five lights, 28 ft. high, with tracery in their heads. The extreme length of the church, including the vestibule in front, and the ministers', deacons', and ladies' vestries behind, is 130 ft., its breadth 63 ft., and height 53 ft. The transepts are 23 ft. by 30 ft. At the north-east end of the church the vestries on either side are terminated octagonally, between which is an open arcade of arches. The church is constructed to seat 1,040 persons, but by the erection of transept galleries, the accommodation can be increased to upwards of 1,200. The stone employed in its erection is a white stone from the neighbourhood of Whitby. The architects are Messrs. Lockwood & Mawson, of Bradford. Mr. Johnson is clerk of the works. The cost of the erection, including the price of the ground, is expected to be about 10,000*l*.

THEATRES.

At *Drury Lane*, Shakspeare is just now at home, drawing densely-crowded houses on the Saturday nights, when fresh plays are produced, and "good business" the rest of the week. In "Othello," neither Mr. Phelps nor Mr. Creswick is well suited, and the play drags heavily for the most part. We look more hopefully to the revival of "Cymbeline," on Monday, and the return to the London stage of Miss Helen Faucit.

Haymarket.—Madlle. Beatrice, the new actress from abroad, has succeeded, without creating any great *furore*, in interesting the English play-going public. Her appearance and bearing are greatly in her favour, and her pronunciation of the English tongue good. Mr. W. Farren's acting in the piece in which she appears, "Madlle. de Belle Isle," is much to be commended. In "Presented at Court," Mr. Buckstone resumes his original character, *Geoffrey Wedderburne*, and greatly delights his audience.

The Princess's.—"The Streets of London" has proved, as we foresaw, a lasting success. Apart from the remarkable excellence of the scenery the construction of the piece is thoroughly dramatic, and every part in it is well worked up, and remarkably well played. This was the case in the "Colleen Bawn," "The Ticket-of-Leave Man," and other of the long-runs, and should be remembered by managers generally. The "Puffy" family, with their good kind hearts, come out as a distinct and striking group; nor are such hearts rare amongst the poor, difficult as it may be to preserve them. *Badger*, as played by Mr. George Vining, is the central part of the piece; but all the other characters have their fair share of opportunities, and the result is a striking whole, which will probably take the manager up to Christmas, with flying colours.

Books Received.

VARIORUM.

"The United States Sanitary Commission, reprinted from the *North American Review* for April, 1864. Boston: Crosby & Nichols." The Federalists have profited by our costly experience in the Crimea, and have not waited till their armies were decimated by insanitary arrangements, as we did, before appointing a sanitary commission. In this reprint the scheme of its operations is unfolded, and the nature, methods, and results of its labours are examined. The various labours in which the commission engaged were grouped in two separate but co-ordinate departments,—that of preventive service and that of supplementary supply and relief,—both of which were equally inspired with the ideas of health, humanity, and patriotism. The *preventive* or strictly sanitary and scientific department of the work, from the first, has comprised,—1st, a corps of sanitary inspectors; 2nd, a bureau of sanitary and vital statistics; 3rd, the directorship of the distribution of the commission's supplementary supplies or "sanitary stores;" 4th, the preparation and publication for free distribution among medical and other officers, of compendious monographs upon the most practical subjects in army hygiene, surgery, and medicine. The department of *relief* is co-ordinate with that of *sanitary inspection*, and, so far as its ministrations relate directly to life and health, it is under the direction of the inspectors or medical officers of the *preventive* or sanitary department of the service; while the various branches of *relief* not thus related to the sanitary service constitute the system which is designated as that of *special relief*. All these branches of the commission's work sprang into operation under the original scheme of organization, and from the pressure of events during the early months of the war. During the past six months, the vast assemblage of hospitals within the defences of Washington, the field-hospitals at Gettysburg, and the entire sick population of General Gilmore's command, have been provided by the Sanitary Commission with full supplies of vegetables, and all other fresh provisions that could best be obtained from the markets of Philadelphia and New York. The total expenditures of the Commission for such supplies, during the last three months of 1863, amounted to nearly 120,000 dollars. It is stated, upon good authority, that more than a hundred thousand Federal soldiers have been wounded in battle since the war began, and that disease has already brought into the military hospitals,

general and regimental, *upwards of two millions* of cases. The President of the Commission has stated that "50,000 dollars would not cover the cost of our whole service [of supplementary supplies] in the first two weeks after any one of our great battles. At Gettysburg it was 75,000 dollars."——"Ince & Gilbert's Outlines: Descriptive Geography—Outlines of Roman History. Kent & Co., Paternoster-row." We have already spoken in commendatory terms of this series of outlines; and, we think, of the part on Descriptive Geography itself, by Professor Wallace, now before us. The "Outlines of Roman History" are by the Rev. E. Boger, M.A., Head Master of St. Saviour's Grammar School, Southwark, and give a condensed and skilful view of Roman history, exceedingly well adapted for the young of both sexes.——The *Art-Journal* has a chapter on "Ancient Egyptian Decoration," illustrated with a number of drawings by Mr. Edward Hopley. W. J. Müller, who died too soon, is the artist whose style and character are illustrated.——The paper, "Imogen in Shakspeare and in Sculpture," in the October *Fraser*, reviews the statues which were submitted to the Art-Union of London in reply to their offer of 600*l.* for the best. The writer, with especial condemnation of "Imogen" as misrepresenting Shakspeare's creation, deduces from the collection that "many of our sculptors seem contented to appeal, not to the common noble features of our nature, but rather to its physical instincts and its pruriency." We do not desire to endorse the observation: we simply note it.——The *Art-Student* for the month has a good deal of instructive writing and interesting chit-chat.——Under the heading "Men I have known" (in the current number of the *Leisure Hour*), understood to be by a veteran in literature, William Jerdan, an interesting and appreciative notice is given of the late John Britton, author of the "Cathedral Antiquities." They were friends of long date, and the memoir shows that Mr. Jerdan fully understands the difficulties under which Britton ran his remarkable career. Mr. Jerdan proposes, we believe, to publish as a volume these pleasant notices of men he has known.——Amongst the reading-books for the young that have reached us is an addition to the series known as "The Magnet Stories," by Mrs. Broderip, titled "Wee Maggie." The subject is not novel, the struggles of an orphan girl; but the story is told with a good and graceful pen. We may also name in the same paragraph, "The Crosses of Childhood; or, Alice and her Friends," and "Marie and the Seven Children," by Mrs. Geldart, both published by Partridge. All are illustrated to a certain extent.

Miscellanea.

The Temple.—A handsome range of stone-fronted houses has been erected on the vacant ground in the Temple, facing the Temple gardens. Professor Smirke, R.A., is the architect. Other houses will be built hereafter to complete the façade.

Kenilworth Church.—A correspondent asserts that in the present "restoration" of Kenilworth parish church, the low window in the south chancel wall, and the sedilia, both of fourteenth century work, are condemned to destruction! Why?

Illuminations by Female Artists.—Messrs. E. Fuller & Co. offer two *prizes* for the best original composition designed and illuminated on vellum. As we read the offer, however, it seems to be little more than an endeavour to get two good designs at a very cheap rate. Exhibitors are only to be charged 15 *per cent.* on the amount of any sales that may be effected. How kind of Messrs. Fuller!

Buddha in Birmingham.—The copper statue of Buddha, 7 ft. in length, which was discovered by Mr. E. B. Harris, C.E., while excavating for a railway at Sootan, in the Bengal Presidency, has reached Birmingham, and is destined, by the proprietor, Mr. Thornton, to be placed in the Midland Institute. This statue is said to be of extreme antiquity: it was found 10 ft. below the surface, and underlying the covered ruins of a temple, which must have been built upon the site, of a still more ancient temple or monastery amongst the ruins of which the statue was found. It is entire except one of the feet, and is reported to be of masterly workmanship. The age of it is called 2,500 years.

Water Supply for Gainsborough.—A water-works company is about to be formed at Gainsborough. A good many shares, we learn, have already been taken.

Rochdale Borough Surveyorship.—On the 6th, Mr. Alfred Fowler was appointed borough surveyor of Rochdale. There were fifty-five applicants for the office.

Surrey County Hospital.—The last four numbers of the *West Surrey Times* contain a long account of the county hospital now progressing towards completion; from the designs of Mr. E. W. Lower. Mr. W. Barnes is the builder; the amount of the contract, 11,303*l.* The total cost is expected to be about 15,000*l.*

Missing Almshouses.—A Tewkesbury paper states that the late Mr. John Dent left 8,000*l.* to the town of Winchcomb to build and endow almshouses and schools at the expiration of four years from his decease: he died in October, 1855 (nearly nine years ago), and not one stone of either building has been laid yet.

Preservation of Wood.—The following method is used in Germany for the preservation of wood:—Mix 40 parts of chalk, 40 of resin, 4 of linseed oil, melting them together in an iron pot; then add 1 part of native oxide of copper, and afterwards, with care, 1 part of sulphuric acid. The mixture is applied while hot to the wood by means of a brush. When dry it forms a varnish as hard as stone.

Valuations under the Lands Clauses Act. In the case of Cotter *v.* The Metropolitan Railway Company, a valuation made by a surveyor, appointed under the provisions of the 85th section of the Lands Clauses Consolidation Act, 1845, who never entered the buildings valued, was held by Vice-Chancellor Kindersley not to be a proper valuation within the meaning of that section.

The Old Town-wall of Southampton.—We are glad to observe that the town council have at last resolved, by a majority of sixteen to fourteen, to purchase the site on which the fragment of the town wall stands, which was lately redeemed from immediate destruction as building materials, so that the relic will be permanently secured. Some of the councillors, however, still threaten further opposition to the granting of the requisite money—some 300*l.*,—although it will yield 3 per cent. per annum on the outlay.

"Westminster Chapel."—With reference to the view we recently gave of new Westminster Chapel, the Secretary of the Committee says,—"I shall be obliged by your stating that the building referred to is being erected for the church and congregation long established on the same spot, under the pastorate of the Rev. Samuel Martin, to take the place of a much smaller building erected in 1841, the accommodation afforded by which proved insufficient for the congregation; and is not, as might be inferred, a new undertaking of the Congregational body. In reference to the statement as to the heating of the building, I beg also to say that the committee have not yet come to any decision as to the system to be adopted, and have, as yet, simply made such provisions as would be necessary in any case."

Liverpool Architectural Society.—The first meeting of the seventeenth session was held on Wednesday, the 5th, Mr. Joseph Boult presiding. The chairman called the attention of the members to a view of the interior of the newsroom of the New Exchange, which had been left there by Mr. Wyatt, the architect. It was announced that a prize for the best view of Duke-street, looking towards the Sailors' Home, had been awarded to Mr. N. G. Taylor. The chairman delivered an address, in which he said it was sixteen years since the society was instituted; and to those who remember the state of the profession in the town at that time it was manifest that the society had been very serviceable, but its beneficial effects might be augmented. He referred to the unwillingness of some architects to join the society, and said it was important to beware lest *esprit de corps*, so valuable within proper limits, degenerated into exclusive and vulgar arrogance. Professional training was very good, but it would not create an architect of the highest order. He invited co-operation in the healthy working of the society. He also commented upon the report of the town improvements projected and in progress, and advocated play-grounds and large public parks.

The Drinking Fountain Movement.—A fountain has been erected in Hull, at the cost of Mr. R. Sykes, and was recently inaugurated by the mayor.

Isle of Man.—The Public Works Loans Commissioners have granted a loan of 52,800*l.* to the Isle of Man Harbour Commissioners, to be applied to the construction of a breakwater at Port Erin.

Quebec Custom-house Burnt.—The costly new Custom-house at Quebec, finished only in 1860, has been destroyed by fire, probably originating in connexion with the plumbers' work which had been going on for some days on the roof.

New Masonic Hall at Hartlepool.—The members of the Harbour of Refuge Lodge of Freemasons, No. 764, of West Hartlepool, have laid the foundation-stone of a new Masonic hall. The building site is in the vicinity of Christ Church, nearly opposite the National Schools. The new hall will be a stone erection, and will afford large accommodation. The architect for the building is Mr. J. Tilleman, of Sunderland; and the builder, Mr. J. Johnson, West Hartlepool.

Water Supply at Horsforth.—The late scarcity of water having been seriously felt at Horsforth, a number of the inhabitants of that place resolved to form a joint-stock company for the purpose of establishing waterworks. Engineers were invited to compete, a premium of 50*l.* being offered for the best set of plans submitted. The directors received eight designs, and from them selected as best one received from Mr. McLandsborough, C.E., who has been instructed to carry out the scheme.

The Sheffield Inundation Commission.—The first meeting of the commission constituted under the Water Company's (Bradfield Inundation) Act, to ascertain and assess the claims against the company arising out of the disaster in March last, took place in the town-hall, Sheffield. The proceedings were held in the sessions-court, which was crowded during the day by numbers of the working classes, many of whom had, no doubt, an interest at stake. The commissioners are three in number, the chief being Mr. Wm. Overend, Q.C., and his colleagues, Mr. J. J. Smith, J.P., and Mr. M. F. Mills, estate agent, Chesterfield. The Water Company were represented by Mr. B. Smith, and there was a numerous attendance of gentlemen of the legal profession interested on behalf of the claimants. The Act gives to the commissioners very extensive powers. Their orders have all the effect of a verdict at *nisi prius*; and there is no appeal from their decision. After various cases were heard and disposed of, the sitting was formally adjourned until the 7th of November.

A Smoke-consuming Furnace.—There is in operation at the engineering works of Messrs. Moreland, Old-street, City, a furnace patented by Mr. E. B. Wilson, which is said to economise fuel to a considerable extent, and which may be rendered almost smokeless. This furnace, which is used for heating rivet bars, has no fire-bars. It consists of a chamber, or box, at the back, to contain the fuel, and a reverberating oven connected therewith, the flue being at the other end of the oven, and connected with the ordinary chimney-stack. The coals are ignited in the box, to which they are supplied about twice a day. As there are no fire-bars in the furnace, the air enters upon the surface of the fresh coal in the box, causing a downward draft, as the floor of the reverberating oven slants downwards from the coal-box. The gas is thus slowly and continuously distilled until it comes in contact with the lower strata of burning coals, when it receives its proper dose of caloric, and passes into the reverberating oven, heating any material that may be placed there, and passes away downwards by the flue which descends at a point a little inwards from the mouth of the oven. The principle adopted seems to be simply that of turning a common fire upside down, not unlike "the *Builder's* Fire," or a furnace back foremost, so that the fresh coal is applied at that end whence the smoke of its first ignition goes through the fire and is consumed, instead of being placed on the end of the fire, whence the direction of the draft carries it off as soon as evolved. The principle is very simple, and probably efficient, though not novel. The Messrs. Moreland, we believe, have no special pecuniary interest in the invention.

Guernsey.—A ladies' bathing-place, at the Vallette, Guernsey, is to be commenced forthwith, and is to be completed by the close of the year. It will consist of a broad platform, 25 ft. in width, extending from the slip at La Vallette in a northerly direction, and abutting on a ridge of rock which is found there. A flight of steps will conduct from the platform to the bottom of a gully formed by nature, between the aforesaid ridge of rock and another lower ridge on the south side of the gully. Mr. John Duquemin is the contractor.

Monumental.—At a meeting of the Wolverhampton Albert Memorial Committee, it has been unanimously resolved that Mr. Thornycroft, the sculptor, proceed with the work; the mayor to move in council for permission to use the site now occupied in the High Green by the Russian cannon. The memorial will be an equestrian statue, larger than life, and its cost, with conversion of the gun pedestal, will be about 1,150*l*. ——Sir Roderick Murchison writes to the *Times* that his geographical friends and himself have resolved to move for the erection of a suitable monument to Captain Speke. He appeals for contributions. —— Foley's statue of Father Mathew, the apostle of temperance, was unveiled on Monday, in Cork. The pedestal, which is from a design by Mr. Atkins, architect, is 9½ feet high, of limestone, and contains on either side a drinking-fountain. The principal stone in the pedestal weighs over three tons. The figure, which is cast in gun metal, weighs 33 cwt., and stands 8½ feet high.

Building Operations at Freshwater, Isle of Wight.—A private company have purchased 400 acres of land for building purposes, in the parish of Freshwater, and including Alum Bay. A hotel is now building there at a cost of 5,500*l*., the architect being Mr. Frere, of London, and the builder, Mr. Wheeler, of Cowes; and a house, containing sixteen rooms, is also nearly finished in the immediate neighbourhood of the new hotel: in addition, a London building firm have just secured twenty acres of the land, upon which they intend erecting a number of villas, at a *minimum* cost of 1,600*l*. each; and for the accommodation of the population a new church is to be erected at a cost of 2,500*l*. A new road, of an average width of 33 feet, exclusive of the footpaths, has been already made from the New Hotel to Weston, and this road is to be carried on from the latter place into Yarmouth at the cost of the Highway Commissioners.

Iron.—The *Iron Trade Circular* says,—"At the preliminary meeting of the Ironmasters' Association, held on the 29th ult., at Birmingham, it was resolved unanimously 'That the prices of iron remain the same as fixed on last quarter day.' With a similar unanimity the meeting adopted the further resolution 'That, in the opinion of this meeting, the most determined resistance should continue to be offered to the demands of the colliers now on strike, as well as to those of the men whose notices are about to expire; and if, by the continuance of their disgraceful and illegal practices and acts of intimidation towards both men and masters, in this and other disticts, the supply of coal is still further diminished, the members of this meeting will be prepared to blow out their furnaces and shut up their mills and forges.' Prices stand at, —pigs (best hot-air), 3*l*. 5s. to 4*l*. 5s.; seconds, 3*l*. 10s. to 3*l*. 12s. 6d.; cinder pigs, 3*l*. to 3*l*. 5s.; hæmatites, 3*l*. 10s.; Forest of Dean, 3*l*. 15s. to 4*l*. 5s.; North Staffordshire pigs, 3*l*. 5s.; Cleveland pigs, 3*l*. 2s. 6d. to 3*l*. 8s., long weight, delivered into this district. Manufactured iron, —bars (marked), 8*l*. 10s.; hoops, 9*l*. 10s.; sheets, singles, 10*l*.; doubles, 11*l*. 10s.; lattens, 13*l*. All other descriptions in proportion at makers' works. The Midland district of Engand, and the central hive of industry, is almost in a state of insurrection, so far as the working population are concerned: 300 police are kept on the alert night and day, and the volunteers (a new employment for our national defenders), have been mustered and kept under arms lest the colliers on strike should march (as they promised) into Birmingham for other purposes than beggi-g. Such a state of things has not been witnessed since 1836. Nor is the mischief likely to rest here. Owing to the commercial treaty between England and France, several reductions of duty, of great importance to the iron trade, have come into operation. Cast iron, which is subject at present to an import duty of 2f. 50c. the 100 kilogrammes, will pay 2f. Bar iron, which pays at present 7f., will pay 6f."

Manchester New Town-hall.—The City Council have decided, by a majority of one, in favour of the Albert-square or police-yard site for their proposed new town-hall. It has been resolved to go to Parliament for powers to purchase this piece of land, and to apportion the outlay between the two townships.

Workmen's Shakspeare Memorial.—A meeting of the Executive took place at St. John's Gate, Clerkenwell, on Tuesday evening. A long list of subscribers having been read over, in which many well-known names appeared, it was reported that sheets of the Shakspeare Heads, containing seventy penny receipts, were now ready to be issued to persons who felt an interest in the movement, and that a large number had already been applied for from benefit, trades, and working men's literary societies.

Value of Land, Newport.—Last week several lots of freehold and copyhold land were sold by auction at the Crown and Anchor Inn, Newport, near Staddlethorpe. Lot 1 was a close of arable land, in the township of Gilberdike, containing upwards of eight acres: it was sold to Mr. J. Shaw, of Newport, for 450*l*. Lot 2 consisted of two closes of arable land at Eastrington, called "Two Nine Acres," containing, as the name implies, eighteen acres. This was bought in at 1,000*l*. Lot 3 comprised a close of arable land, and was six acres in extent. Mr. G. Scruton, of Newport, was the buyer at 265*l*. Lot 4, a close of swarth land, comprising three acres, was sold to Mr. Wm. Oliver, of Wallington, for 181*l*. Lot 5, a close of swarth land, containing four acres, was knocked down to Mr. F. Leak, of Hotham, for 315*l*.

The London Association of Foremen Engineers.—At the last ordinary monthly meeting of this society, at its rooms, in Doctors' Commons, City, the business transacted was principally connected with the position and prospects of the institution. The number of members, honorary and ordinary, was stated to be over 100. The funds amounted to about 400*l*. It was determined that no candidate for ordinary membership could in future be received after he had attained the age of fifty years, and that a majority of votes in the proportion of four to one should be substituted for the unanimous vote hitherto required. Mr. J. Newton (who presided) strongly urged upon his fellow-associates the necessity for their production of a regular series of papers, to be read at the meetings to be held during the ensuing winter. Some new members were elected.

Melting and Casting Steel and other Metals.—A new system has been patented provisionally by Mr. Rochussen, who claims for it the advantage of great saving in labour, fuel, fire-clay, crucibles, furnace-bars, &c., and in shortening the time required for melting, and running less danger of injury to the metal by the action of oxygen, carbonic oxide, carbon, and sulphur. The temperature of the furnace is said to be completely under control. The patentee claims, as entirely new and peculiar, the principle of,—1st, casting without removing the crucible from the furnace; 2nd, that of filling the whole capacity of the crucible with molten metal, by means of charging the hollow cover. A description of the invention would require to be illustrated by engravings.

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Aviss & Son	2,648	0	0
Adamson & Sons	2,639	0	0
Greig	2,626	0	0
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Warskett	£1,740	0	0
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Dudley	1,440	0	0
Wheeler	1,436	0	0
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Turner & Sons	1,389	0	0
Child & Son (accepted)	1,369	0	0

For a beer-house and offices, at the North Camp, Aldershott, for Mr. J. H. Daveran. Messrs. Eggar & Stapley, architects:—

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Birch	530	0	0
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For new Wesleyan school-room, &c., Penge. Mr. F. Boreham, architect:—

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REPRINTED FROM "CHAMBERS'S JOURNAL," *OCTOBER* 15, 1864.

THE LONDON SHOP-FRONTS.

THERE are few people who have not been struck with the magnificence of the London shop-fronts. They form one of the most prominent indications of the grandeur and wealth of the metropolis. Enormous plate-glass windows, gilded or polished brass frames, expensive mirrors, polished mahogany frames, and all sorts of fancy woodwork; sometimes crystal columns, and generally a singular covering of iron Venetian blinds, which roll up and down by intricate machinery, like a stage curtain displaying or concealing the gorgeous scenery within—these are the necessary decorations of a fashionable London shop of the middle of the nineteenth century.

The whole system of the London shop-front decoration may be properly analysed into three divisions,—namely, 1. Plate-glass Windows; 2. Ornamental Brass Sash-bars; 3. Revolving Iron Shutters.

Regarding the plate-glass windows, however, we shall have very little to say. The process of the manufacture of plate glass, together with its multifarious application in the decorative arts, is familiar to all. Still, we may point out that the fiscal regulations of this country with respect to plate-glass for many years interposed the most serious obstacles to its important uses; that it was not until the duty was removed by Sir Robert Peel that it came into free use; and that the consumption has now increased to an extent which has no parallel in the history of fictile manufactures. The origin of plate-glass decoration carries us back to the Italian cities of the Middle Ages, and to the magnificent period of the Venetian republic. It reached its height, perhaps, as an artistic development at the French court of Louis XIV. although there are larger plates in the Palais-Royal and the Louvre at the present day. The Parisians, who, it must be admitted, are our masters in the principles of interior decoration, are exceedingly lavish in their expenditure of plate-glass, particularly in the form of mirrors; but we think the English surpass them in the master of windows. These, indeed, have sometimes reached a size so enormous that we hardly know how to estimate their cost; and they have properly become the subject of a special form of assurance, where their risk of destruction or fracture is guaranteed at a certain moderate premium on the cost. It will be remembered, of course, that, by the common law of the country, a shopkeeper cannot recover more than the statutory sum of two-and-sixpence for an accidental fracture of his plate-glass windows; and this was abundantly proved during the proceedings instituted against the civil authorities which sprang out of the Chartist riots. Some of the largest windows in London contain from two hundred to three hundred pounds worth of plate-glass; and windows with extraordinary large plates, such as occur in Oxford-street or Regent-street, may amount to twice this value.

The original brass window-frame, or sash-bar, was made of pieces of brass cast in short lengths, and soldered together. There were certain difficulties, however, always experienced in making good work and an elegant finish in this kind of work. For example, the castings were not always of the same colour; the joints were easily seen; and the metal being sometimes porous or honey-combed, as is the case in all castings, absorbed the polishing-paste or other impurities, and looked very ugly. To obviate these disadvantages, the French hit upon the expedient of making the bar out of one single length of sheet-brass, with an interior skeleton of wood. Brass sash-bars, as we now see them, are therefore a French invention, although they have been much improved in principle of construction by the present manufacturers. The French invention formed the subject of a patent in this country by the late Mr. Richard Cureton, of Brentford, from whom Messrs. Bunnett & Co. of Deptford, purchased it about the year 1838 or 1839. The invention was then in a very crude state; and, in order to carry out their plans of improvement, the last-mentioned engineers constructed for their manufacture one of the most powerful draw-benches in the kingdom, on the model of that employed in her Majesty's Mint, capable of drawing very large mouldings and sash-bars in all manner of sectional forms, from the square to the circle, and in every variety of ornamental design. What appears a solid brass window-frame consists, therefore, in reality, of a stout, well-seasoned oaken centre or core, supplied with a thin outer covering of sheet-brass. The method of manufacture is highly ingenious. In the first place, the seasoned oak or other hard wood—mahogany, we believe, is often used—is cut into the required form by one of those singular moulding-machines which gave so much offence to the operative joiners at the builders' strike. Then a length of sheet brass is cut to the requ'red width, and shaped in dies to correspond with the outline of the wooden moulding or bar. The wood is then placed in this shell; and with suitable top-dies of a peculiar formation, the outer edges of the metal which project beyond the wood are turned over and so firmly compressed—metal and wood, core and case—as to resemble a solid substance; indeed, we believe that one of these bars may be cut into thin slices on the section, not thicker than a sixpence, and yet retain its coherence as firm as if made of solid metal. The sheet-brass makes a better surface and receives a better polish than the old cast brass sashes which were once in use; and strange enough it would seem (but easily understood by those who are acquainted with the statics of hollow beams), that the bar with the wooden core is much stronger than one made of solid metal, and will resist probably ten times as great a lateral pressure—a pressure, for example, arising from the thrust of a crowd. It should be explained that this is partly due to the iron tongue which travels the length of the bar, and serves at once as the rebate for the reception of the glass, and as an additional support. After being polished by the usual process, these brass bars are mitred at the corners; and after being screwed together in their place, are ready for the reception of the plate-glass. The sizes of these sash-bars vary from 1 inch to a foot, or 15 inches in circumference. Some of their designs are very beautiful; and the Greek ogee moulding predominates as an architectural type.

The brass window-frame which contains the plate-glass has a peculiar base, which is technically termed a "stall-plate;" it is the plate on which the shopkeeper's name and occupation are usually displayed. It had its name, we suppose, when the London shops in reality rejoiced in the literal title of stalls, before the era of plate-glass and brass bars; but now it is simply used for the purpose we have named—the groundwork or shield on which the shopman may emblazon his title and degree. This stall-plate, which is an indispensable adjunct of the whole window, is manufactured partly in the same way as the sash-bars, by being drawn through steel dies to the required shape, which is usually that of an ogee or double curve. The engraving on some of these brass plates is worthy of notice. It is a branch of art of itself.

The ornaments connected with brass fronts, such as those on the bases and capitals and between the spandrels of the arches, are for the most part cast from original models, and in harmony with the designs supplied by the architect of the building. These designs in London are not restricted to one particular school of art. A cursory glance along Oxford-street or Piccadilly will supply instances of every style of architecture under the sun. The highest form, and that which is most in vogue, is the pure Greek type—of this, one of the best examples in London is Hodge & Lowman's in Regent-street. Maclean's in Fleet-street, is a gorgeous specimen of the French decorated school. Hyam's, in Oxford-street, is a magnificent example of the Tudor. Copestake's, in Bow Church-yard, is highly ornamented Norman-Gothic. Chappel's, in New Bond-street, was designed by Mr. Owen Jones, and is, of course, the purest Alhambra—even to the letters on the stall-board! The most wonderful display of brass and plate-glass in all London is, perhaps, that of Moses & Son, in Aldgate and the Minories; their fronts, however, as far as we can see, do not belong to any particular school, but are a compound of all. Cast-iron bars, enamelled and bronzed, are also used extensively in shop-fronts. They can be made quite as ornamental, and are more economical than brass; and the public taste is at this moment running a good deal in this direction.

Revolving iron shutters are a modern invention. They have not been in use for more than thirty years, and the introduction of this useful and ingenious contrivance for the protection of property from robbery, from fire, and from civil commotion, was due in a great measure to the late Duke of Wellington, who introduced them into Apsley House. It was in the year 1837 that Messrs. Bunnett & Co. obtained their original patent; and their shutters were first applied to the premises of Swan & Edgar, in Regent-street, where our readers have often doubtless observed them. Nearly all the banking and insurance companies at once adopted them; then the goldsmiths and jewellers; and now there is hardly a respectable shop of any description erected without them. They are, besides, in very general use throughout the Continent of Europe and America, as well as the British Colonies. Some of the most expensive shop fronts in the world are to be seen in Melbourne, in Australia. Although revolving shutters are for the most part made of iron—always so for banks and goldsmiths' shops—generally so for the windows of ordinary places of business—yet, where greater elegance is required, they are frequently made of bright or bronzed brass or copper. Where economy is more studied than strength, they are made of wood; but whether made of wood or metal, the principle of a revolving shutter is the same, being all constructed of narrow strips or laths, varying from one to two inches in width, connected together with wrought-iron hinges, and revolving round on iron rollers (either vertically or horizontally, as required by the construction of the window), when they are opened or shut. If large shutters, they are wound up or down by a worm and wheel gearing; if small shutters, with a simple arrangement of balance-weights, like the ordinary window-sash. At first, the expense of these shutters was very great, and deterred many from their use; but now that powerful machinery is applied to their manufacture, the cost, we believe, has been reduced to something like one-half of what it was originally. In fact, it may be seen that revolving shutters are gradually superseding the old-fashioned wooden shutters for all but the more humble description of shops; and we do not think the public need regret this, seeing the risk attending their being put on; nor the poor shopmen, who were kept so late putting them on. The largest and most massive iron shutters in London can be raised or lowered in less than three minutes.

The first description of revolving iron shutters were constructed with what is termed flat laths, or, in plainer language, of common hoop-iron. But a considerable defect belonged to these shutters, particularly when made of large size, from their easy deflection and consequent weakness; for example, they could be bent in and out like a sheet of canvas, or up and down like a weak suspension-bridge. Accordingly they have been generally superseded by a lath of convex shape, which was patented in 1844; which, again, in 1850, was improved on by inflecting the lath into an ogee or curvilinear form—a form which is found to combine the maximum of strength with the minimum of weight.

These "curvilinear shutters," as they are called, are made at Deptford, from iron hoops of the best quality, which are formed into the required curve, by drawing them through steel dies. The laths are then passed under a very quick-acting tilt-hammer, with polished steel head and anvil, which makes them very stiff, and hardens and straightens them at the same time. They are then punched for riveting on the hinges in a press, which makes all the holes at once; and the hinges themselves are punched at the same press, which insures perfect accuracy in the fitting on. The hinges are manufactured by a variety of ingenious processes, which we have no room to describe; but they are all made by machinery—a file or a drill is never employed. The laths are then taken, one by one, and placed on a bench; the hinges are riveted on in rows at a certain distance; when the required number of laths are thus fastened together—one hundred or two hundred, perhaps—the revolving iron shutter is complete. The machinery for winding and unrolling is too technical to be of interest, although highly ingenious. We shall only notice further the last improvement in this direction, which is termed the "interlocking shutter."

The "interlocking revolving shutter" is an American invention, and certainly an ingenious one. They are formed without either hinges or rivets. The patent refers to nothing more than a method of doubling or convolving, so to speak, the edge of the one hoop round the other, so as to constitute a kind of hinge—making the whole shutter one series of hinges, in fact, turning on their own axis. This is accomplished by a ponderous and expensive machine made for the purpose, which is, we believe, the only one of its kind in the world. The two edges of the lath being turned over in a volute—the one somewhat longer than the other—they are joined together by simply sheathing the one in the other; and as this joint is perfect from end to end, no force can possibly separate them. These interlocking shutters, of themselves so strong, can nevertheless be made very light, and are therefore suitable for fixing inside of rooms with existing windows. We believe they can be made to work without gearing by a system of graduated balance-weights, so easily that a child or a female servant can manage them; and they are, we are told, particularly well adapted for a state of society where brigandage prevails, as in Italy; where assassination is frequent, as in the west of Ireland; and particularly where burglary is not uncommon, as in certain districts of good old England. Indeed, the great recommendation of these iron shutters consists in the fact, that they are all more or less "fire-proof, thief-proof, and bullet-proof."

With regard to the use of iron shutters for safety against fire, this was curiously exemplified in a recent conflagration in the City. "The large and handsome warehouses"—we quote from the "Times" of 22nd December—"of Messrs. J. & R. Morley, situate at the corner of Gresham and Wood Streets, overlooked by a large window on the ground-floor at the back of the little court in which the fire originated, and to which it was at first confined. This large window was protected on the outside by a revolving iron shutter, and that more against robbery than fire. For some time the flames played fiercely but harmlessly about the outside of the window so guarded by the iron shutter. Had they once entered Messrs. Morley's premises at that point, the stock stored inside, and estimated at from 250,000*l.* to 300 000*l.* would inevitably have been destroyed, if, indeed, the devastation would have ended in that one vast pile of buildings. Upon such a slender condition of safety did property almost fabulous in value, and belonging to a single firm, depend in this case."

The use of iron shutters of the kind described, as a preventive of robbery, has been found of the highest value. It is quite impossible to open them from the outside; it is quite impracticable to "cut through a panel" or to "force a hinge." We have it on the authority of an experienced City detective that the most expert "craftsmen" never venture to attack these iron-clad windows. They have a greater affection for the old wooden shutters, which yield so freely to their ordinary implements.

With regard to their application to warlike purposes, to which, in these days, all such inventions are more or less subordinated, we have to report a most novel and singular application of the principle by the Spanish Government, who had constructed in London a series of revolving "steel mantelets" for the protection of the crews of their vessels of war, when proceeding up the Moorish rivers. The pirates were in the habit of picking off the men on board, from ambuscades on the banks; and to prevent this ball-practice, those mantelets—made of steel strips, about 3 inches wide, and strongly hinged and curved, so as to make the balls glance off—were hung at the sides of the vessel. When not in use, they were rolled up and stowed away. Of course, they were not intended to act as defences against an Armstrong gun!

Finally, with regard to their important uses in civil commotion—of which this country is happily so free—we may remark that iron shutters are rapidly being introduced into all the thoroughfares of the principal cities of continental Europe. They have long been used in large towns of the United States. The salvage of property in Paris during the last coup, and in New York during the late riots, from this protection, was almost incalculable.

NOTE.—All the SHOP-FRONTS, REVOLVING IRON SHUTTERS, and STEEL MANTELETS, referred to in the foregoing Article, were

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Brecon, 14th September, 1864.

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GEO. E. HEARDER, Clerk to the Board.
Local Board's Offices, Town Hall, Torquay, September 27, 1864.

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